Final Pre-CMS Data Collection Work Plan

FORMER RHONE POULENC SITE

TUKWILA, WASHINGTON

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Certification

On behalf of the respondents, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. I certify that the information contained in or accompanying this Final Pre-CMS Data Collection Work Plan is true, accurate, and complete. As to those portions of the report for which I cannot personally verify accuracy, I certify under penalty of law that this report and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who may manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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ACRONYMS AND ABBREVIATIONS

C	Celsius
CMS	Corrective Measures Study
CO_2	carbon dioxide
COC	constituent of concern
DI	deionized
DO	dissolved oxygen
DOC	dissolved organic carbon
DOF	Dalton, Olmsted & Fuglevand, Inc.
EPA	Environmental Protection Agency
GAC	granular activated carbon
GWPT	groundwater pump & treat
HCIM	hydraulic control interim measure
mg/L	milligrams per liter
mV	millivolts
NTU	nephelometric turbidity units
Order	Administrative Order on Consent No. 1091-11-20-3008(h)
PCBs	Polychlorinated Biphenyls
PMP	Performance Monitoring Plan
PRG	Preliminary Remediation Goal
RCRA	Resource Conservation and Recovery Act
S/cm	siemens per centimeter
SVE	soil vapor extraction
SVOCs	semi-volatile organic compounds
TPH	total petroleum hydrocarbons
TDS	total dissolved solids
TSS	total suspended solids
VOCs	volatile organic compounds

1. INTRODUCTION

The former Rhone-Poulenc facility (site) is located adjacent to the Duwamish Waterway in Tukwila, Washington. This Pre-Corrective Measure Study Data Gaps Work Plan (work plan) was prepared in response to The Environmental Protection Agency's (EPA) March 2021 letter regarding the "Determination of Need for Additional Work" to identify data gaps and document plans for performing data collection to support preparation of the Corrective Measures Study (CMS). The CMS is being performed to address the requirements of the Resource Conservation and Recovery Act (RCRA) Administrative Order on Consent (Order) No. 1091-11-20-3008(h).

The site is located on about 750 feet of shoreline on the east side of the Lower Duwamish Waterway (LDW) just north of Slip 6, at approximately river mile 4.2. The West Parcel is bounded by the Museum of Flight and Raisbeck Aviation High School to the east, the 8801 E Marginal Way South Site to the north, the LDW to the west, and Slip 6 to the south (Figure 1). Investigation and cleanup of the Facility is being conducted under the above-referenced Order by former owners, including Solvay, Inc. (formerly Rhodia Inc.) and Bayer CropScience Inc. (corporate successors to the former Rhone-Poulenc company), and the current owner, Container Properties, L.L.C.

This work plan documents the objectives, data gaps, and data collection that will assist in preparation of the CMS.

1.1. Statement of the Problem

In 2006, the property underwent redevelopment and was split into two parcels. The East Parcel was investigated and cleaned up in cooperation with EPA. The EPA determined in 2017 that the East Parcel cleanup was fully complete with no controls required. This parcel was purchased and redeveloped by the Museum of Flight in 2006. The cleanup of West Parcel is ongoing in cooperation with EPA under the Order.

Significant progress has been made at the West Parcel in investigating groundwater, soil, and sediment contamination and controlling risks posed by contamination. An Agency Draft CMS Work Plan was prepared in 2014 and the CO_2 Pilot Study was conducted after that. The draft CMS Work Plan presented contaminant conceptual model information to support evaluation of cleanup alternatives, but seven years have passed, additional treatment and natural degradation has occurred, and relevant site preliminary remediation goals have been revised. All of these factors warrant collection of additional data to:

1. Support engineering design information that will be used to assess corrective measures alternatives in the CMS.
2. Update the understanding of current contaminant conditions.

1.1.1. LONG TERM HYDRAULIC CONTROL OPERATIONS

The hydraulic control interim measure (HCIM) groundwater pretreatment system has been in operation since 2003 following installation of a low-permeability subsurface barrier wall, a groundwater recovery system, and a performance monitoring well network inside and outside the barrier wall. The HCIM resulted in control of a majority of the contaminated groundwater plume at the West Parcel and continues to work effectively as an interim measure. Construction of the barrier wall and groundwater recovery system is documented in the Hydraulic Control Interim Measures Implementation Report (RCI, 2003). The facility underwent redevelopment in 2006 including regrading and repaving, effectively capping the area encompassed by the barrier wall. Since 2008, the system has treated and discharged between 1 and 2 million gallons annually, dependent on precipitation driving the Duwamish Waterway river stage. The system has maintained a 72-hour averaged inward hydraulic gradient of greater than 1-foot since start of operations.

The Agency Draft CMS Work Plan (AMEC, 2014) included a preliminary screening of remedial technologies to be included in the CMS for the site. This evaluation included consideration of potentially shutting down the groundwater pumping component of the HCIM as part of the final remedy for the site. Conducting a temporary passive operation of the interim measure, under intensive monitoring, will allow water levels to rise and hydraulic gradients to equalize, while still being protective of potential down gradient receptors. This passive operation will provide data to allow for better evaluation of contaminant concentrations and migration.

1.1.2. POST-CARBON DIOXIDE PILOT STUDY DESIGN

A pilot study of the technology using carbon dioxide (CO_2) injection for neutralizing groundwater affected by high pH was conducted between 2018 and 2019. This technology has had a limited history of use; site-specific testing was conducted to assess its applicability and to collect detailed information needed to evaluate CO_2 injection as a component of the CMS alternatives. Results of the study were promising; however, full scale design questions have been identified that would be helpful to address prior to completing the CMS.

1.1.3. CURRENT CONDITIONS CONTAMINANT CONCENTRATIONS

The Agency Draft CMS Work Plan (AMEC, 2014) included presentation of site contaminants and historical operations, as a supplement to the much older 1995 RCRA Facility Investigation; however, EPA has requested that the CMS more clearly identify and consider:

- Historical contaminant source areas;
- Interim actions completed to address contamination; and
- Current site contaminant conditions still warranting remedial action.

In addition, the relevant Preliminary Remediation Goals (PRGs) require review and update based on current regulations, site conditions, and potential future site uses.

Select figures from the Agency Draft CMS work Plan (AMEC, 2014) and data figures discussed in a March 2021 technical meeting with EPA are provided in Attachment 1.

2. DATA COLLECTION OBJECTIVES

The objective of the data collection tasks described in this section is to address the data gaps identified in Section 1, specifically:

- Collecting information to be used for future evaluation of long term remedial options that may eliminate reliance on the HCIM.
- Collecting information to be used for future evaluation of full scale design detail for groundwater pH neutralization.
- Updating the conceptual site model for current conditions to be addressed by the final corrective measure.

These objectives are discussed further in the following subsections.

2.1. Hydraulic Control Performance Evaluation

The HCIM included the installation of a subsurface low-permeability barrier wall that surrounds, to the extent practicable, the environmentally impacted upland portion of the site. The area surrounded by the barrier wall is shown on Figure 2. The barrier wall is complemented by a system of groundwater extraction wells that pumps groundwater from inside the contained area to establish and maintain an inward-directed groundwater gradient. The recovered groundwater is pretreated in a permitted, on-site treatment system and is discharged to a King County treatment works. The surface of the site is almost entirely paved with asphalt. The pavement surface, in conjunction with a stormwater drainage system, minimizes infiltration of surface water to the subsurface area enclosed by the barrier wall (AMEC, 2014).

The objective of the hydraulic control performance evaluation proposed in this work plan is to determine how the HCIM hydrogeologic system and contaminant concentrations and transport behave during a period of temporary groundwater pumping cessation. The wall is one of the subsurface features that influences and will continue to influence the site conceptual model and must be considered as part of the basis for remedial design. The shutdown period will allow for collection of the following information:

1. COC concentration information inside and outside of the HCIM wall.
2. Information related to how COCs could potentially migrate vertically and horizontally across the site without an inward hydraulic gradient.
3. Information related to the effects of water level rebound on the potential for COCs mobilizing from the vadose zone to groundwater.
4. Additional information to aid in design for corrective measures that do not rely on the HCIM as a long-term solution.

Proposed data collection includes assessing cross-wall containment transport and groundwater flow response under passive hydraulic containment conditions by allowing groundwater elevations inside the barrier wall to fluctuate with the exterior, tidally influenced, groundwater elevations.

2.2. CO_2 Treatment Pre-Design Information

The CO_2 Neutralization Pilot Study Results report (Wood, 2020) confirmed the technical feasibility of injecting carbon dioxide for neutralizing high pH groundwater, but concluded that further evaluation was necessary to design for scaled-up neutralization of the high pH target area. In particular, the report suggested that relative remedial costs for different application scenarios need to be evaluated in parallel with other site remediation action objectives to determine the most effective remediation plan. Pilot study injections were completed in 2018 with the last round of pilot study monitoring completed in February 2019.

The objective of additional monitoring is to confirm the report's conclusions on pH rebound and soil buffering capacity, as well as pH and contaminant migration. Confirming rebound and migration trends will aid in choosing and designing an effective corrective measure. Proposed data collection includes collecting groundwater data for geochemical parameters and targeted contaminants in the area treated by the pilot study.

2.3. Contaminant Conceptual Site Model Update

The historical sources of soil and groundwater contamination at the site were summarized in the 2014 Agency Draft CMS Work Plan (AMEC, 2014), and documented in numerous historical reports which describe the historical industrial operations that occurred at the site. Historical reports describe that the historical manufacture of artificial vanilla flavoring, or vanillin, through chemical processing of wood cellulose contributed to sources of contamination at the site. The manufacture of vanillin involved the use of toluene, copper sulfate, and caustic soda. Figure 3 shows historic operational areas, as documented in the 2014 Agency Draft CMS Work Plan (AMEC, 2014).

Since the implementation of the HCIM and other interim measures, groundwater conditions have changed. In order to proceed into the CMS it is important that the current site conditions be understood, in addition to documenting past sources and nature of contamination. This includes consideration of:

- Updates to Preliminary Remediation Goals (PRGs),
- Interim remedial measures conducted at the site, and
- Recently collected data at and near the site.

The objective of the data collection proposed for this data gap is to address uncertainty associated with the current conditions, as presented in the 2014 Agency Draft CMS Work Plan, and to adequately determine the nature and extent of contamination. Current soil, groundwater, and sediment contaminants and contaminant concentrations are needed to evaluate appropriate corrective measures technologies and address risk posed by contaminants in soil, groundwater, and sediments. Proposed tasks include:

- Assessing conditions of and rehabilitating monitoring wells, as necessary, for obtaining representative samples.

- Assess current conditions of the site groundwater by collecting and analyzing groundwater samples from select existing monitoring wells for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polycyclic biphenyls (PCBs), dioxins/furans, or metals in areas of the site for which data gaps exist spatially, vertically, and temporally.
- Developing a revised list of soil, groundwater, and sediment contaminants of concern (COCs) based on newly collected groundwater data, existing data, and updated PRGs.

2.3.1. CONSIDERATION FOR REVISED PRGS

EPA developed the original PRGs for the site in March 2014. Since then, revisions have been required because of changes to assumptions and criteria used to inform the PRGs. Accordingly, EPA prepared spreadsheets with current criteria for soil and groundwater constituents and provided these to DOF in September 2020. In order to revise PRGs EPA developed a comprehensive list of potential COCs based on investigations that documented the presence of hazardous constituents in the soils, groundwater, sediments, and pore water at the site. In addition to quarterly groundwater monitoring, investigations of the West Parcel include the following:

- 1986 – Site Screening Investigation, Dames and Moore
- 1990 – RCRA Facility Assessment, PRC Environmental for EPA
- 1991 – Site Assessment, Landau Associates
- 1995 – Final RCRA Facility Investigation Report, CH2M Hill
- 1996 – Round 3 Data and Sewer Sediment Technical Memorandum, RCRA Facility Investigation
- 1998 – Interim Measures Report, PCB Remediation & Sewer Cleaning, Rhodia, Inc.
- 2000 – Round 6 Groundwater Monitoring, AGI
- 2001 – Geoprobe Investigation Report, AGI
- 2006 – Revised Pre-Demolition Investigation Report, Geomatrix Consultants
- 2006 – Voluntary Interim Measure Report, Hazardous Waste Storage Area and Transformer A Area Cleanup, Geomatrix Consultants
- 2007 – West Parcel Redevelopment Report, Geomatrix Consultants
- 2007 – Northwest Corner Affected Soil Removal Report, Geomatrix Consultants
- 2012 – Sediment Characterization Data Report, AMEC Environment & Infrastructure, Inc.
- 2012 – Shoreline Soil and Groundwater Characterization Data Report, AMEC Environment & Infrastructure, Inc.

The primary hazardous constituents known to be present at the site include toluene, copper, and elevated pH due to release of caustic materials. Additional potential COCs include PCBs, polycyclic aromatic hydrocarbons, semivolatile organic compounds, and several metals. A complete list of hazardous constituents and their maximum concentrations detected in soil, groundwater, and sediments that was generated by EPA as part of reviewing PRGs at the Facility is provided in Attachment 2, along with background information provided by EPA regarding PRGs.

EPA shared spreadsheets containing draft revised PRGs with DOF to facilitate updating the site conceptual model of contamination for the CMS and identify data gaps. These PRGs will be used to refine the COCs to be evaluated in the upcoming CMS. Actual cleanup levels and points of compliance will be determined during the CMS process. It is possible that COCs may be added or removed for specific areas or throughout the site, as will be further determined in the CMS.

DOF performed the following steps to identify data gaps the new PRGs might present leading into the CMS.

- Compared highest historical concentrations of potential COCs to revised PRGs to determine which analytes have ever been detected above a potential PRG in various media.
- Reviewed how recently collected data (last five years) compared to draft PRGs.
- Reviewed recent data to determine if data are available for different areas of the site (i.e. inside and outside barrier wall).
- Reviewed other analytes of interest discussed with EPA.

Results of these steps are described below and tabulated summaries are included in Attachment 3.

Screening of Historical Highs

<u>*Step 1*</u>: DOF screened the highest historical detection in groundwater against the draft 2020 PRGs provided by EPA. Data used in screening were identified from EPA's historical review completed as part of drafting updated PRGs and was cross-checked with the project database. The following constituents were detected at least once at a level that exceeded the draft PRGs:

Metals:

Aluminum	Iron	Nickel
Arsenic	Lead	Selenium
Cadmium	Manganese	Vanadium
Chromium (total)	Mercury	Zinc
Copper		

Volatile Organic Compounds (VOCs):

Benzene	Toluene
Ethylbenzene	Naphthalene

Semi-volatile Organic Compounds (SVOCs):

Pentachlorophenol	2-Methylphenol	Phenol

<u>*Step 2*</u>: DOF screened the highest historical detection in soil against draft 2020 PRGs. Data used in screening were identified from EPA's historical review completed as part of drafting updated PRGs and was cross-checked with the project database. The following constituents were detected at least once at a level that exceeded the draft PRGs:

Metals:

Antimony	Copper	Selenium
Arsenic	Iron	Silver
Barium	Lead	Vanadium
Cadmium	Manganese	Zinc
Chromium	Mercury	
Cobalt	Nickel	

VOCs:

Acetone	Formaldehyde	Naphthalene
Benzene	Methylene Chloride	
Bromoform	Toluene	
1,4 Dichlorobenzene	Trichloroethene	
Ethylbenzene	Xylenes	

SVOCs:

Pentachlorophenol	Bis(2-ethylhexyl)phthalate	4-Methylphenol
Benzo(a)anthracene	2,4-Dimethylphenol	Phenol
Benzo(a)pyrene	Fluoranthene	2-Propanol
Benzo(b)fluoranthene	2-Methylphenol	
Benzyl alcohol		

Pesticides:

Alpha chlordane	4,4'-DDE	Dieldrin
4,4'-DDD	4,4'-DDT	Chlordane

PCBs:

Aroclor 1254

Step 3: Constituents detected in soil that only exceeded the soil PRG protective of groundwater, that were not identified as a potential groundwater constituent of concern in Step 1 were eliminated. This reduced the soil list of constituents to:

Metals:

Arsenic	Iron	Nickel
Cadmium	Lead	Selenium
Chromium	Manganese	Vanadium
Copper	Mercury	Zinc

VOCs:

Benzene	Toluene
Ethylbenzene	Naphthalene

SVOCs:

Pentachlorophenol	Bis(2-ethylhexyl)phthalate	2-Methylphenol
Benzo(a)pyrene	2,4-Dimethylphenol	4-Methylphenol
Benzyl alcohol	Fluoranthene	Phenol

Pesticides:

4,4-DDT Dieldrin

PCBs:

Aroclor 1254

Additionally, several constituents were eliminated in Step 3, but associated groundwater data for these constituents was not located. This will be reviewed as part of the data gaps assessment through further historical record review and consideration of data gaps groundwater sampling.

Sediment screening is pending receipt of 2020 Lower Duwamish River sampling and will be assessed once those data are received later in 2021. EPA has shared preliminary results and expects a results report to be released this spring.

Recent Groundwater Data

Groundwater is currently monitored at a variety of wells for metals and VOCs (aluminum, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc, benzene, ethylbenzene, and toluene) as part of HCIM performance monitoring. SVOCs (including naphthalene) were monitored in 2015 across the site, but not since. Results were generally non-detect but reporting limits were higher than are attainable now.

See Attachment 3 for tabulated screening summary tables. This assessment will be reviewed and revised after completion of 2021 groundwater sampling events conducted as part of this data gaps assessment and groundwater sampling Rounds 91 and 93.

2.3.2. CONSIDERATION FOR POST-INTERIM MEASURES CONDITIONS

Several interim measures have been conducted at the facility since the original contaminant characterization work was completed in the 1990s. These actions need to be considered in planning for a final corrective measure at the site as they have altered and generally improved site conditions with regards to remaining contamination. Figure 4 shows the approximate locations of interim measures described in this section.

2.3.2.1. 1995 Interim Measures

Polychlorinated biphenyls (PCBs) were removed from soils, process drains, and storm sewers at the Facility in 1995. Activities were summarized in a 1998 Interim Measures Report (Rhodia, 1998). The PCBs were detected during RFI sampling in the area of a concrete autoclave compressor pad and a sewer line. Once the concrete compressor pad was removed, the underlying soil in an area approximately 16 feet by 21 feet to a depth of 10 feet was excavated for disposal. Confirmation soil samples results showed PCB concentrations all below 2.5 mg/kg.

PCBs were also detected in a decommissioned buried 8-inch drainpipe discovered during installation of underground power lines. A trench was excavated with soil removed from an area 31 feet long by five feet wide trench and 3.75 feet deep and several areas were widened based on soil sampling performed during the excavation. Confirmation soil samples showed one sample with a result slightly higher than the other area of cleanup (31.12 mg/kg Aroclor 1254). Sewer lines were also cleaned at this time since the plant had ceased operations and Metro had notified Rhone Poulenc Inc. that stormwater could no longer go to the sanitary sewer and needed to reroute to the Duwamish Waterway. The lines were cleaned prior to this modification. Groundwater was not recently tested in this area of the site. The location of both of these excavation areas are shown on Figure 4.

2.3.2.2. 1999-2002 Soil Vapor Extraction

A soil vapor extraction (SVE) interim measure to remove toluene from the subsurface in the area near the former toluene storage tank was completed in 2002. This area is located south of Building 3 and shown on Figure 4. This SVE system operated from October 1999 through November 2002. Approximately 61,300 pounds of toluene and other volatile chemicals were documented as removed from the subsurface by this system (AMEC, 2014).

2.3.2.3. 2003 Hydraulic Control

Hydraulic control included a barrier wall, extractions wells, hydraulic control monitoring wells, conveyance piping, and pre-treatment system (Originally installed in the Main Distribution Center Building [Building 3, Figure 3]). The barrier wall was designed and constructed in 2002-2003 to encircle the areas of historical releases of primary COCs to the extent possible. It is located approximately 50 feet inland from the shoreline due to stability constraints and to allow for potential future shoreline habitat restoration, as shown on Figure 2.

2.3.2.4. 2006 Actions Triggered by Property Development

Several interim actions were conducted in 2006 to remove areas of contamination identified during demolition of aboveground structures at the facility. These were documented in the 2014 Agency Draft CMS Work Plan and various reports provided to EPA during the redevelopment of the facility. Work included:

- Demolition and removal of remaining historic structures, including remaining buildings and sumps.
- Demolition of the cement pad at the former hazardous waste storage area revealed oil-stained soils containing TPH in the oil and diesel ranges. These soils were excavated for off-site disposal.
- Contaminated soil was excavated along the northwestern corner of the property to remove soils affected by petroleum, copper, and other contaminants released by apparent historic dumping of materials along the northern property line (Geomatrix, 2007).
- Toluene impacts to soil and groundwater were identified on the border between the Museum of Flight and Container Properties parcels, resulting from a toluene release from an underground pipe. The pipe was cut, drained, and a portion was removed during the excavation work. To mitigate toluene-impacted groundwater in this area SVE and air sparging were conducted. Low levels of toluene remained in a small portion of the Museum of Flight property adjacent to the West Parcel following SVE Operations. The groundwater cleanup continued in a limited area in the southwest corner of the East Parcel and southeast corner of West Parcel via biosparge operations between 2012 and 2015. Four subsequent groundwater sampling events were conducted between September 2015 and July 2016, during which toluene concentrations

remained below laboratory detection limits. The EPA determined in 2017 that the East Parcel cleanup was fully complete with no controls required (EPA, 2017).

In addition to removal of contamination and demolition of historic structures, new redevelopment on the West Parcel included (shown in Figure 2):

- The site was regraded and paved;
- A new stormwater system including new piping, catch basins, and treatment vault were added;
- A new GWPT building was constructed along the northern property line and extraction well piping was re-routed; and

While primarily done for property development, the combination of paving and stormwater improvements reduced infiltration of stormwater inside the barrier wall.

2.3.2.5. 2018-2019 CO_2 Pilot Study

The CO_2 pilot study was performed to assess the effectiveness and feasibility of CO_2 injection to neutralize high pH groundwater prior to preparation of the CMS. The pilot study was performed inside the barrier wall (Figure 4) to limit potential adverse effects during the study. The pilot study confirmed the technical feasibility of the technology, but indicated additional evaluation was necessary to implement full-scale use.

2.3.3. CONSIDERATION FOR RECENT CONTAMINANT CHARACTERIZATION

Historical soil and groundwater investigations conducted at the site have shown that the west side and southwest corner of the site have been affected by releases of potential COCs. Other COCs at the site that have been investigated over time include polycyclic aromatic hydrocarbons, methylene chloride, benzene, PCBs, SVOCs, aluminum, arsenic, chromium, lead, mercury, nickel, vanadium, and dioxins/furans.

Historic data trends presented in routine performance monitoring reports have shown toluene to be the primary VOC observed and decreases in toluene concentrations have occurred at locations monitored inside the subsurface barrier wall (MW-17, MW-28, MW-29). Toluene has remained low in concentration at locations monitored outside the barrier wall since 2003. Trends in dissolved metals, with copper being the primary metal detected, show copper has decreased at exterior wells MW-40 and MW-41 and increased at interior pumping well EX-3. pH levels have remained generally stable, with higher pH found in the southwest corner of the site. Carbon dioxide treatment for in this area may have altered conditions in recent years. SVOCs were last tested across the site in 2015 and were not detected, but lower reporting limits are now attainable by the laboratory.

Preliminary reporting provided by EPA showed dioxins/furans and PCBs were recently detected in sediments as part of design investigations being performed as part of the Lower Duwamish Waterway Superfund cleanup. A former incinerator was identified in historical drawings as being present at one point near the shoreline north of the site (Figure 3 [Location 41]). Recent groundwater sampling has not included either dioxin/furan or PCBs at the site, though historical samples did not identify either of these as COCs in groundwater. Collection of samples near the shoreline and in areas related to historical use would allow for updating the current conceptual model and accounting for improved laboratory methods that can achieve lower reporting limits.

3. APPROACH

This section describes what additional data collection or analysis is proposed to address data gaps.

3.1. Preliminary Remediation Goals (PRGs) Update

As described in Section 2, initial screening of revised PRGs was performed in 2020 using historical site data. Additional sampling for groundwater and soil constituents was determined to be necessary to provide current site condition data for comparison against the revised PRGs. As part of completing the data gaps work, newly collected data will be screened against revised PRGs to develop a revised list of soil, groundwater, and sediment COCs.

3.2. Temporary Groundwater Pumping Cessation

The hydraulic control performance evaluation is targeted to coincide with falling river stage levels in the Duwamish Waterway generally observed in later winter or spring each year. Monitoring under passive hydraulic control conditions will include collection of:

1. Baseline water level and analytical data (prior to system shutdown),
2. Monthly observation of water levels inside and outside the barrier wall (at multiple depths), and
3. Periodic field parameter and analytical monitoring of barrier wall perimeter monitoring wells (depending on baseline observations.)

The approach to this task is outlined in the adaptive management flow chart presented in Figure 5. An adaptive management approach will be used to continually collect data, assess, and determine next steps over the course of the planned six month test period. The six month test period is inclusive of the annual sampling event (Round 93, September 2021) allowing for collection of groundwater samples within the subsurface barrier wall following water level equilibration. If data gaps are remaining after Round 93, then a request for an extension to the test period will be requested from EPA to allow for collection of additional data.

The combination of hydraulic information (vertical and horizontal gradients, water table elevation, etc.), field water quality parameters, and contaminant concentrations will be utilized to assess changes in fate and transport inside and outside the barrier wall. Trends and changes in this data will be compared over the test period and also compared to the extensive historic data sets from previous performance monitoring. The baseline data, in concert with the decades of historic data, will aid in evaluation of changes and may help determine the cause of changes (i.e. if changes are a result of movement across the wall or water coming up through the aquitard or changes in environmental conditions from an outside influence).

If data collection indicates a threat to water quality outside the HCIM as detailed in Figure 5, system pumping will resume in accordance with the Revised Operation, Monitoring, Inspection, and Maintenance Plan (AMEC Geomatrix, 2010).

3.2.1. BASELINE MONITORING

As initial round of water level measurements and groundwater quality sampling will be conducted prior to system shutdown to provide a baseline data set for evaluation purposes during pumping cessation. Water level measurements will provide data for calculation of horizontal and vertical gradients inside and across the barrier wall to further understand the changing gradients that may occur during the test. Groundwater quality samples will provide initial concentrations for use in determining monitoring requirements during pumping cessation.

Water level measurements will be measured at the wells shown in Figure 6 including from wells near the barrier wall on both the inside and outside, as well as centrally located within the wall where there are well pairs with multiple screen intervals. These same wells will continue to be monitored throughout the performance evaluation period.

Analytical samples will also be collected from the wells shown in Figure 7, gathering data from wells near the barrier wall on both the inside and outside.

3.2.2. WATER LEVEL MONITORING

As part of performance monitoring, water levels are monitored on a quarterly basis. Water level monitoring during the pumping cessation will increase in frequency for both those collected manually and via transducer measurement. During the evaluation period, monthly water level measurements will be collected within the barrier wall; and transducers currently installed in wells MW-51, MW-52, and MW-53 will be set to record groundwater elevations hourly (Figure 6). The transducer in MW-47 will be set to record hourly and will be moved to MW-54, allowing for continuous water level monitoring for the upper and lower zone well pair (MW-53 and MW-54). Monitoring will provide adequate spatial coverage and frequency to assess performance of the barrier wall while water levels inside equilibrate and allow for detection of changes in gradients that may require additional analytical monitoring to assess the potential to accelerate contaminant migration across the wall. Historic transducer water level data from MW-49 and DM-8 provides decades of data for comparison to help assess if changes due to pumping cessation are out of the previously normal range.

Previous water level observations have generally shown an upward hydraulic gradient from the deep aquifer to the lower zone of the shallow aquifer, through the aquitard. Changes in the gradients (direction and size) and water levels in the wells will be monitored during the pumping cessation period and compared to the baseline results, as well as historical gradients and water levels, to evaluate changing conditions as water levels within the barrier wall rise. Due to variations in lithology (heterogeneity) within the deep aquifer, variability across the site is expected.

3.2.3. WATER QUALITY MONITORING

Water quality monitoring (analytical and field parameter monitoring) will be used to assess the impact of water level rebound within the barrier wall on COCs, i.e. the potential mobilization of COCs within the vadose zone and the potential cross barrier-wall/aquitard COC transport.

Analytical and field parameter monitoring will be conducted at key locations identified following baseline monitoring through the adaptive management flow chart (Figure 5). From this flow chart, wells will either be sampled on a monthly or semiannual basis for COCs outlined as part of the baseline monitoring event.

The objective of the of the water quality monitoring is to assess changes in groundwater chemistry inside and outside the wall and to determine the potential for COC migration from the interior of the site to the exterior wells with or without the hydraulic containment measure.

The baseline monitoring data set along with previous semiannual performance monitoring data collected, will be used for assessing changes in groundwater chemistry during the passive evaluation period. These general parameters are helpful for evaluating changes in geochemistry. General water quality parameters (pH, oxidation/reduction potential [ORP], dissolved oxygen, specific conductance, and temperature) reached steady-state conditions as of September 2005 (AMEC Geomatrix, 2009). Significant change in pH or ORP could indicate changes in potential for metals migration or adsorption. Groundwater flow through the wall is very slow and semi-annual monitoring has proved to be sufficient for cross-wall geochemical changes (AMEC Geomatix, 2009).

If contaminant concentrations are greater inside the barrier wall than outside the barrier wall, more frequent monitoring will be conducted throughout the duration of the pumping cessation to check for signs of migration. If concentrations are greater outside the wall than inside the wall, then wells will be monitored semi-annually, coinciding with performance monitoring events. If contaminant concentrations outside the wall begin to increase during the evaluation period and are projected to exceed PRGs within five years from the sampling date, the pumping system would be restarted.

3.2.4. TREATMENT SYSTEM OPERATIONS DURING EVALUATION

The HCIM will be switched to passive operations, with the groundwater pretreatment system extraction wells turned off during the evaluation. Power to the treatment system will remain on to allow recording of the water levels in wells MW-49 and DM-8. During the evaluation, the system will be periodically cycled to verify functionality. The granular activated carbon (GAC) vessels will be drained between cycling events to prevent fouling during the extended period of shut down.

3.3. Groundwater Sample Collection

As described in EPA's March 2021 letter, EPA and DOF collaborated over several technical meetings to establish a specific groundwater sampling task to address uncertainty associated with the current conditions, as presented in the 2014 Agency Draft CMS work plan, and to more precisely determine the nature and extent of contamination. Groundwater samples will be collected from a broader suite of wells and for a broader suite of potential COCs than have previously been tested and thereby provide a current snapshot of conditions. Data collected will also inform the performance evaluation during groundwater pumping cessation and the geochemical conditions in the vicinity of the CO_2 pilot study.

Figure 7 shows the sampling to be conducted to address this current data gap and includes testing for all of the analytes mentioned in EPA's 2021 letter. Table 1 summarizes the samples to be collected and the rationale for this sampling. An updated version of the project Quality Assurance Project Plan (QAPP) was also prepared and will be submitted to EPA concurrent with this work plan (DOF, 2021). The QAPP update accounts for current staff, the data gap scope of work, and updated sampling methods to attain the mandated lower reporting limits.

4. DATA COLLECTION METHODS

This section describes the methods to be used to implement the various pre-CMS data gap tasks.

4.1. Well Inspection and Rehabilitation

Twenty-five of the wells identified for monitoring are not part of the current performance monitoring well network and therefore have not been inspected or sampled in years. These wells, along with currently monitored wells, were inspected to verify suitability for sampling groundwater and to evaluate if redevelopment will be necessary prior to sample collection. Inspection of the monitoring wells included removal of the dedicated pump(s), if necessary, and measuring the total depth to evaluate siltation at the bottom of the well. Recent sampling data were reviewed to evaluate if evident decreases in purge rates or water level drawdown occurred outside of allowable ranges.

Seven wells were identified for redevelopment. A summary of the inspection and recommendation was submitted via email to EPA on March 26, 2021 to allow for appropriate redevelopment of wells as much ahead of before groundwater sampling as practicable. Well development will follow EPA's Ground Water Forum document *Monitoring Well Development Guidelines for Superfund Project Managers (EPA, 1992).*

4.2. Groundwater Elevation Monitoring

Manual water levels will be measured either during a low tide or high tide to minimize tidal influence during the measurement period, per procedures identified in the Performance Monitoring Plan (AMEC Geomatrix, 2009). The observed groundwater elevation conditions will be compared to similar tidal conditions observed during the baseline monitoring event along with the monthly groundwater elevation measurements.

The water level information taken from the transducers loggers will be downloaded monthly during the manual water level measurement collection events. The transducer water level data for DM-8, MW-49, MW-51, MW-52, MW-53 and MW-54 will be tracked for the duration of the pumping cessation period.

4.3. Groundwater Sample Collection

Groundwater samples for laboratory analysis will be collected as described in Section 3.3. Groundwater sample collection procedures will follow the Performance Monitoring Plan (AMEC Geomatrix, 2009) and Revised Quality Assurance Project Plan (DOF, 2021). All exterior monitoring network wells along the west and south portions of the barrier wall will be sampled during a falling tide. During purging, general water quality parameters will be monitored for stabilization in all wells prior to sampling.

Based on discussions with EPA, we have considered and incorporated additional sample collection protocols to account for the collection of samples being analyzed for potential COCs that are particularly susceptible to bias from higher turbidity or background contamination. These protocols include:

- Sample collection outside the subsurface barrier wall (tidally influenced), requires sample collection during a falling tide when the groundwater flow direction is from the inland source area to the waterway.

- A peristaltic pump or dedicated bladder pump will be used to purge and sample wells. For wells sampled by peristaltic pump, the tubing will be disposable single use low-density polyethylene and silicone tubing. Pump and tubing intake for sample collection will located at the center of the well screen interval.
- Sample locations will be purged for a minimum of 15 minutes (five stabilization readings, collected every three minutes).
- A water quality instrument will be used to establish stabilization of the following water quality parameters prior to sampling:
    - *Turbidity*: Turbidity > 5 NTU, ±10%; if 3 readings < 5, consider stabilized (NTU)
    - *Dissolved Oxygen (DO)*: DO > 0.5, ±10%; if 3 readings < 0.5, consider stabilized (mg/L)
    - *Specific Conductance*: ±3% (S/cm)
    - *Temperature*: ±1 degree C
    - *pH*: ±0.1 standard units
    - *Oxidation Reduction Potential*: ±10 mV
- The water level meter will be washed onsite with warm tap water and non-phosphate detergent prior to use and rinsed with laboratory-provided DI prior to placement down the well.
    - For wells to be sampled for PCBs, decontamination of the water level meter will include a final rinse with hexane and laboratory DI rinse.
- Low flow purging will continue for a maximum of two hours to achieve a turbidity less than 5 Nephelometric Turbidity Units (NTU) prior to sample collection. If turbidity does not decrease to below 5 NTU, two samples will be collected and analyzed, one for total and one for filtering, by the analytical laboratory for PCB analysis, dioxins and furans, and SVOCs.
    - If sample volume is collected for laboratory filtering, additional volume will be collected for total suspended solids (TSS), total dissolved solids (TDS), total solids, chloride, specific conductance, and dissolved organic carbon (DOC).
    - Laboratory filtering will be through a 1 micron filter.

Other standard operating procedures and equipment calibration requirements are included in the Performance Monitoring Plan (AMEC Geomatrix, 2009) and the Revised Quality Assurance Project Plan (DOF, 2021). The field log for groundwater sample collection is included as Attachment 4. All purge water and decontamination water generated as part of groundwater sample collection will be processed through the pre-treatment system and discharge to King County.

4.4. Groundwater Pumping System Monitoring

During the period of pumping cessation of the groundwater pretreatment (GWPT) system, the GAC treatment vessels will be drained to reduce biological growth within the treatment media. The vessels will be drained through movement of hoses to allow the units to gravity drain to the sewer line. After draining, the hoses will be re-installed in their normal orientation, in the event the system must be restarted.

Quarterly cycling of the GWPT system will be done to assure an operational system, in the event the evaluation indicates restart of the system is necessary. This cycling will include manual operation of each of the three individual extraction wells for a 20 minute period (one hour total) and then turning all pumps to automatic operation to confirm proper function of the Programable Logic Controller (PLC). During cycling of the system, purge water from groundwater monitoring will be processed through the GWPT system. Following the quarterly cycling, the GAC units will be drained as discussed above.

5. REPORTING

This section discusses the reporting approach for the pre-CMS data gaps work.

Progress Reporting

The quarterly Progress Reporting frequency will be increased to monthly during implementation of the work plan. The progress reports will include the following items, in addition to standard progress reporting requirements discussed in the Performance Monitoring Plan (AMEC Geomatrix, 2009):

- Monthly water level measurements;
- Validated analytical data, as it becomes available;
- Discussion of chemical concentration projections, in relation to the adaptive management flow chart provided as Figure 5;
- Documentation of operational decisions made in cooperation with EPA; and
- Discussion of quarterly treatment system operations and maintenance testing.

Round 91 Progress Report

The regular Round 91 progress report will include results of standard spring groundwater sampling typically performed at the site, along with the rest of the baseline groundwater sampling event to be conducted under this Work Plan.

Pre-CMS Conditions Report

A Current Conditions Report will be prepared following conclusion of the work plan tasks and the September Round 93 sampling event. The report will provide:

- A summary of the results of samples collected to address data gaps;
- A discussion of current constituent concentrations relative to historical data;
- An updated description of the nature and extent of contamination that incorporates data collected as part of these tasks as well as pending relevant data from outside sources such as the Lower Duwamish Waterway Group;
- An evaluation of the HCIM hydrogeologic system and effect on contaminant concentrations and transport during the period of temporary pumping cessation;
- Discussion of engineering design data collected to further evaluate long-term effectiveness of the CO_2 neutralization technique used in the pilot study; and
- Revised constituents of concern based on data comparison to the updated PRGs.

This report will provide the additional data necessary to begin preparation of the CMS for the site. The report will also include results from the Round 93 performance monitoring event (September 2021) and will be submitted on the schedule for the Round 93 report (60 days after the validated data set is received).

6. SCHEDULE

Following EPA's approval of this work plan (assumed to occur in April 2021) baseline groundwater samples will be collected as close to the seasonal decrease in river stage as practical. Collection of the Round 91 performance monitoring samples will coincide with the baseline sample collection. Following completion of the baseline sampling event, the groundwater pump and treatment system (system) will be turned off, allowing water levels inside the barrier wall to begin to rise. Following the system shutdown, monitoring will be adaptively managed per the adaptive management flow chart provided as Figure 5.

Monthly groundwater levels and sample collection will occur per Figure 5 and if conditions warrant restart of the system, the pumping cessation test will be abandoned and pumping resume to attain the 1-foot differential across the barrier wall. If conditions do not warrant restart of the system, the pumping cessation will continue until Round 93 sampling occurs in September 2021. At the conclusion of the test, the data report discussed above will be prepared to coincide with submittal of the Round 93 performance monitoring report.

Regular communication between DOF and EPA will continue throughout the implementation of the work plan to discuss field activities and results, allowing for adaptive management during implementation.

7. REFERENCES

AMEC Geomatrix, 2009, Interim Measures Performance Monitoring Plan, Former Rhone-Poulenc Site, Tukwila, Washington: Prepared for Container Properties, L.L.C., August.

AMEC Geomatrix, 2010, Revised Operation, Monitoring, Inspection, and Maintenance Plan, Former Rhone-Poulenc Site, Tukwila, Washington: Prepared for Container Properties, L.L.C., January.

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EPA, 1992, Ground Water Forum, Monitoring Well Development Guidelines for Superfund Project Managers, April.

EPA, 2017, Letter from Timothy B. Hamlin (EPA) to Gary Dupuy (AMEC Foster Wheeler), RE: Determination of Corrective Action Complete without Controls for East Parcel Administrative Order on Consent for Corrective Action (Order) Under the Resource Conservation and Recovery Act (RCRA), Docket No. 1091-11-20-3008(h), August 29.

Geomatrix, 2006, Voluntary Interim Measure Report, Hazardous Waste Storage Area and Transformer A Area Cleanup, Former Rhone-Poulenc Site, Tukwila, Washington, August.

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Wood, 2020, Carbon Dioxide Neutralization Pilot Study Results, Former Rhone-Poulenc Site, Tukwila, Washington: Prepared for Container Properties, L.L.C., May 15.

Tables

TABLE 1
GROUNDWATER SAMPLING COLLECTION AND RATIONALE
Former Rhone-Poulenc Facility
Tukwila, Washington

Well ID	Rationale	GW Quality Parameters	Chemical Analysis											
								Geochemistry						
			BTEX	Total Metals	PCBs	SVOCs	Dioxin/ Furans	Cation/ Anion	Mn	Fe	TDS	Alkalinity	Hardness	Silica
A2	Not recently sampled. Historically detected coper (230 ug/L in 2000).	X		X[2]										
B1A	Sampled semi-annually as part of the PMP.	X	X	X[1]										
B1B	Not recently sampled. Historically detected copper (22.5 ug/L in 1994).	X		X[2]										
B6	Not recently sampled. Historically higher levels of copper (304 ug/L in 1994) and located near the 1995 PCB Autoclave Building sewer line cleanup. The SVOC naphthalene was detected at 2 ug/L in 1994.	X		X[2]	X	X								
DM-4	Not recently sampled. Located near historical "pentachlorophenol handling area" of site, as identified in the 1990 RCRA Facility Assessment.	X				X								
DM-5	Sampled annually as part of the PMP, but not for PCBs. Located near the 1995 PCB Autoclave Building sewer line cleanup.	X	Sept	Sept[1]	X									
DM-8	Sampled semi-annually as part of the PMP, but not for PCBs or SVOCs. Location is along western shoreline which allows for assessing PCB concentrations in groundwater near the Duwamish Waterway. Located in historically downgradient direction from H-10, which had a historical SVOC detection.	X	X	X[1]	X	X								
EX-1	Not recently sampled. Located near historical "pentachlorophenol handling area" of site, as identified in the 1990 RCRA Facility Assessment.	X				X								
EX-3	Sampled quarterly as part of the PMP.	X	X	X[1]										
H-10	Not recently sampled. Historically detected toluene (330,000 ug/L in 1991), copper (96 ug/L in 1991) and pentachlorophenol (5 ug/L in 1994).	X	X	X[2]		X								
Injection Well	Geochemical data will inform long term effects of CO_2 pilot study	X												X
IMW-A1-D	Geochemical data will inform long term effects of CO_2 pilot study	X		X[2]					X	X				X
IMW-A2-D	Geochemical data will inform long term effects of CO_2 pilot study	X												X
IMW-A2-S	Geochemical data will inform long term effects of CO_2 pilot study	X												X
IMW-B1-D	Geochemical data will inform long term effects of CO_2 pilot study	X												X
IMW-B1-S	Geochemical data will inform long term effects of CO_2 pilot study	X												X
MW-12	Not recently sampled. Historically a higher toluene (84,000 ug/L in 1994) and copper (84.1 ug/L in 1994). SVOCs were not detected in 1994. Centrally located on the site.	X	X	X[2]										
MW-17	Sampled annually as part of the PMP.	Sept	Sept	Sept[1]										
MW-22	Not recently sampled. Location is near western shoreline which allows for assessing PCB concentrations in groundwater near the Duwamish Waterway. Not high for BTEX or metals historically, but not sampled for SVOCs. Located relatively near historical "pentachlorophenol handling area" of site, as identified in the 1990 RCRA Facility Assessment and closer to shoreline.	X			X	X								
MW-27	Sampled annually as part of the PMP. Historically high toluene concentrations in this area. Located in historically downgradient direction from H-10, which had a historical SVOC detection.	X	Sept	Sept[1]		X								
MW-28	Sampled annually as part of the PMP. Historically high toluene concentrations in this area. Located in historically downgradient direction from H-10, which had a historical SVOC detection.	X	Sept	Sept[1]		X								
MW-29	Sampled annually as part of the PMP.	Sept	Sept	Sept[1]										
MW-38R	Sampled semi-annually as part of the PMP. Near the vicinity of former incinerator reported in the 1990 RFA, as being north of the this area. PCBs detected in shallow soils nearby in 2015 and is near the shoreline. Located relatively near historical "pentachlorophenol handling area" of site, as identified in the 1990 RCRA Facility Assessment and closer to shoreline.	X	X	X[1]	X	X	X							
MW-39	Sampled semi-annually as part of the PMP.	X	X	X[1]										
MW-40	Sampled semi-annually as part of the PMP.	X	X	X[1]										
MW-41	Sampled semi-annually as part of the PMP. Location is on the western shoreline which allows for assessing PCB concentrations in groundwater near the Duwamish Waterway.	X	X	X[1]	X									
MW-42	Sampled semi-annually as part of the PMP.	X	X	X[1]										
MW-43	Sampled semi-annually as part of the PMP, assessment of geochemical parameters will aid in assessing CO_2 neutralization outside the barrier wall.	X	X	X[1]				X			X	X	X	X

TABLE 1
GROUNDWATER SAMPLING COLLECTION AND RATIONALE
Former Rhone-Poulenc Facility
Tukwila, Washington

Well ID	Rationale	GW Quality Parameters	Chemical Analysis											
			BTEX	Total Metals	PCBs	SVOCs	Dioxin/ Furans	Geochemistry						
								Cation/ Anion	Mn	Fe	TDS	Alkalinity	Hardness	Silica
MW-44	Sampled semi-annually as part of the PMP, assessment of geochemical parameters will aid in assessing CO_2 neutralization outside the barrier wall. Location is along southern shoreline which allows for assessing PCB and SVOC concentrations in groundwater near the Duwamish Waterway.	X	X	X^1	X	X		X			X	X	X	X
MW-45	Sampled semi-annually as part of the PMP, assessment of geochemical parameters will aid in assessing CO_2 neutralization outside the barrier wall.	X	X	X^1				X			X	X	X	
MW-46	Sampled semi-annually as part of the PMP, assessment of geochemical parameters will aid in assessing CO_2 neutralization outside the barrier wall. Location is along southern shoreline which allows for assessing PCB concentrations in groundwater near the Duwamish Waterway.	X	X	X^1	X			X			X	X	X	
MW-47	Sampled semi-annually as part of the PMP. Near the vicinity of former incinerator reported in the 1990 RFA, as being north of the this area. PCBs detected in shallow soils nearby in 2015 and is near the shoreline. Part of well cluster with wells on either side of the subsurface barrier wall. Located relatively near historical "pentachlorophenol handling area" of site, as identified in the 1990 RCRA Facility Assessment and closer to shoreline.	X	X	X^2	X	X	X							
MW-48	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall.	X	X	X^2										
MW-49	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall. Near former toluene SVE operations (1999-2002). Located in historically downgradient direction from H-10, which had a historical SVOC detection.	X	X	X^2		X								
MW-50	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall.	X	X	X^2										
MW-51	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall.	X	X	X^2										
MW-52	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall.	X	X	X^2										
MW-53	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall. Assessment of geochemical parameters will aid in assessing CO2 neutralization near the barrier wall.	X	X	X^2				X			X	X	X	X
MW-54	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall. Assessment of geochemical parameters will aid in assessing CO2 neutralization near the barrier wall.	X	X	X^2				X			X	X	X	X
MW-55	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall. Assessment of geochemical parameters will aid in assessing CO2 neutralization near the barrier wall.	X	X	X^2				X			X	X	X	X
MW-56	Not recently sampled. Part of well cluster with wells on either side of the subsurface barrier wall. Assessment of geochemical parameters will aid in assessing CO2 neutralization near the barrier wall.	X	X	X^2				X			X	X	X	X
MW-58	Historically detected metals along northern property line in soil and some historical groundwater samples (see Figure 3-11 and 3-21 from the 2014 Draft CMS Work Plan)	X		X^2										
MW-59	Historically detected metals along northern property line in soil and some historical groundwater samples (see Figure 3-11 and 3-21 from the 2014 Draft CMS Work Plan)	X		X^2										

Notes:
Chemical concentration data presented was sourced from the 2014 Draft CMS Work Plan (Amec) or the project database shared with EPA.
X^1 = Aluminum, Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Thallium, Vanadium, Zinc
X^2 = Aluminum, Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc
Thallium is only proposed for locations required under the Performance Monitoring Plan(PMP). Thallium has not been historically detected and has not been included as part of metals analysis in locations not included in the PMP.
Sept = sampled in September as part of PMP sampling
GW Quality Parameters = pH, specific conductivity, oxidation reduction potential, dissolved oxygen, turbidity, and temperature (field instrument measured)
Analytical methods to be used: BTEX by EPA 8260D, Total metals & iron by EPA 200.8 & 7470A, PCBs by EPA 8082A, SVOCs by EPA 8270E with SIM & 8041A, Dioxins/Furans by EPA 1613B, cation/anions/manganese by 6010C/D, chloride, sulfate by 300.0, Total phosphorous and total nitrogen by SM 4500, TDS/TSS by EPA SM2540, alkalinity by EPA 2320, hardness by 6010C, silica by 6010D
BTEX = benzene, toluene, ethylbenzene, and xylenes
Fe = iron
GW = groundwater
Cation/Anions = sodium, potassium, calcium, manganese, iron, chloride, sulfate, nitrate, magnesium, total phosphorous, total nitrogen.
Mn = manganese
PCBs = polychlorinated biphenyls
PMP = performance monitoring plan
RFA = RCRA Facility Assessment
SVOCs = semivolatile organic compounds
TDS = total dissolved solids
See Section 4.3 regarding potential TSS, TDS, total solids, chloride, dissolved organic carbon or filtered sample collection

Figures

SOURCES:
PARCEL INFORMATION: KING COUNTY, WA.
AERIAL PHOTOGRAPHY: GOOGLE EARTH PRO, AUGUST 14, 2020.

LEGEND

PARCEL LINE

N

0 150
Scale in Feet

FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

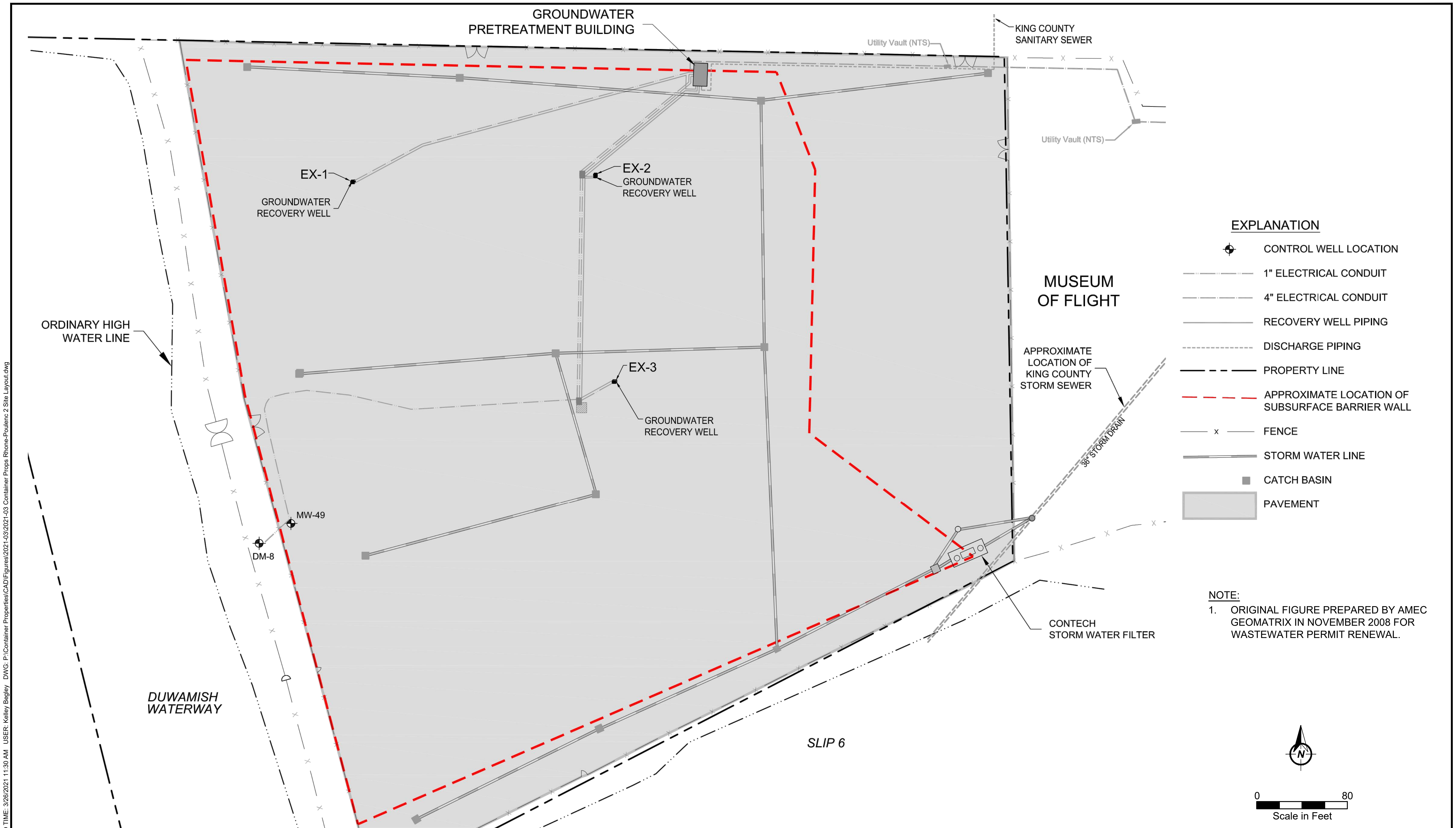
VICINITY MAP

DOF DALTON OLMSTED FUGLEVAND

FIGURE 1

03/26/2021

PLOT TIME: 3/26/2021 4:01 PM MOD TIME: 3/26/2021 4:01 PM USER: Kelley Begley DWG: P:\Container Properties\CAD\Figures\2021-03\2021-03 Container Props Rhone-Poulenc 1 Site LayoutA.dwg



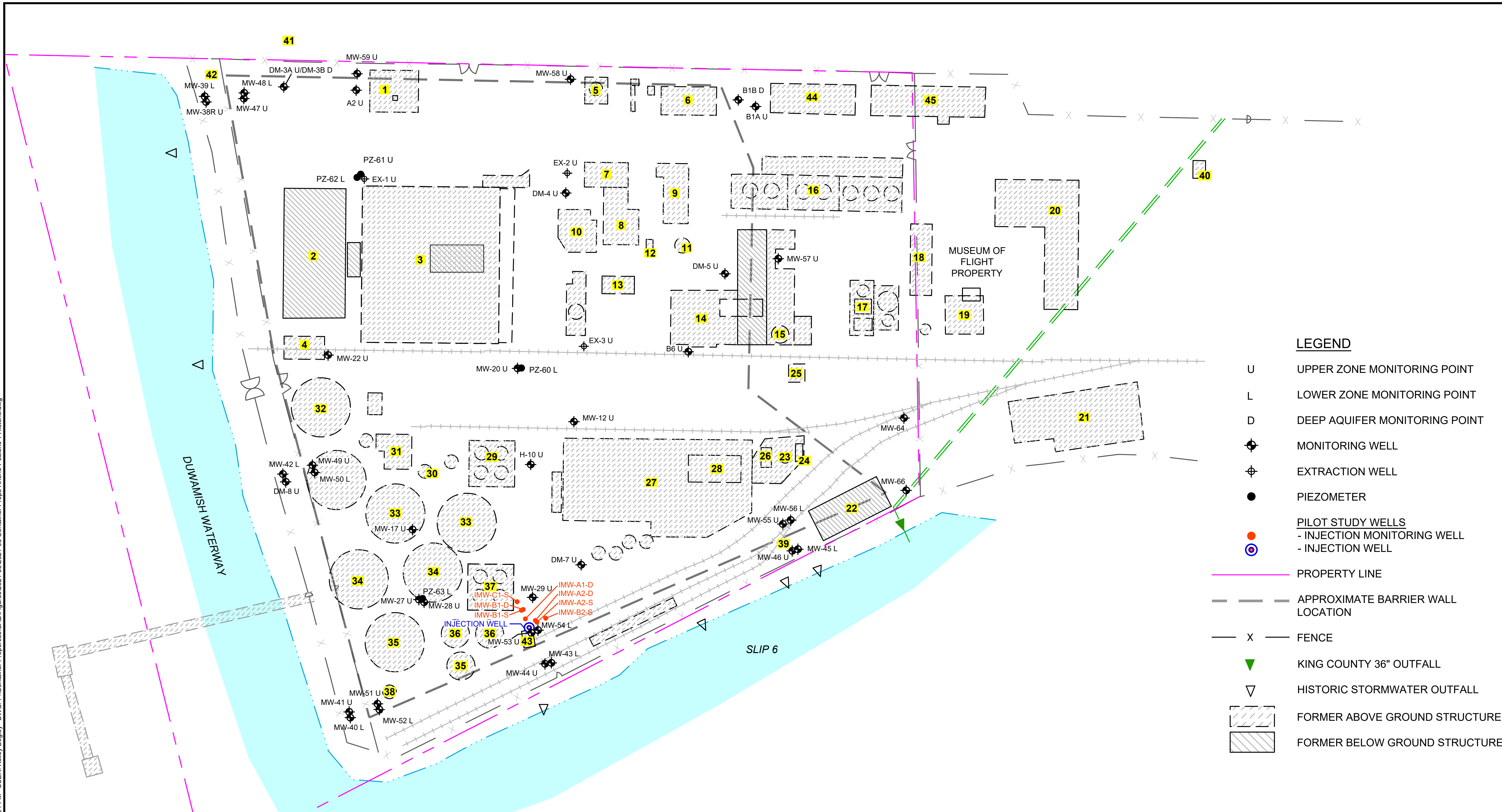
FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

SITE LAYOUT

DALTON
OLMSTED
FUGLEVAND

FIGURE
2

03/26/2021



NUMBER	LOCATION DESCRIPTION	NUMBER	LOCATION DESCRIPTION	NUMBER	LOCATION DESCRIPTION
1	RCRA Storage Hazardous Area	16	In Process Tank Storage (process area)	31	Filter Press
2	Old Meal Bin Building	17	In Process Tank Storage	32	Clarifier
3	Main Distribution Center Building	18	Compressor Shed	33	Sulfite Waste Liquor Storage
4	Soybean Meal Unloading	19	Compressor Shed	34	Vanillin Black Liquor Storage
5	Sulfuric Acid Storage	20	Laboratory	35	Raw Material Storage
6	Cooling Tower	21	Maintenance Building (Southeast)	36	Caustic Storage
7	VSP Vanillin	22	Spill Control/Containment Reservoir	37	Oil and Chemical Tanks
8	Toluene/Bisulfite Extraction	23	Spill Control Reservoir and Sumps	38	Water Tower
9	Technical Vanillin	24	Oil and Grease Separator	39	Railroad Loading/Unloading Area
10	In Process Tank Storage	25	Metro Sump	40	Guard House
11	IPA Extraction	26	Copper Spill Control Sump	41	Incinerator Location
12	Spill Control Reservoir and Sumps	27	Storage and Maintenance Building	42	POW Camp Disposal Location
13	Control Building	28	Storage Area	43	Mersize Sump
14	Autoclave Building	29	Toluene Tanks	44	Change House
15	Oil Storage Area	30	Mud Tank for VBL	45	Office

NOTE:
BASE MAP FROM AGENCY DRAFT CORRECTIVE MEASURES STUDY WORK PLAN BY AMEC ENVIRONMENT & INFRASTRUCTURE, INC. (SEPTEMBER 2014)

N

0 100
Scale in Feet

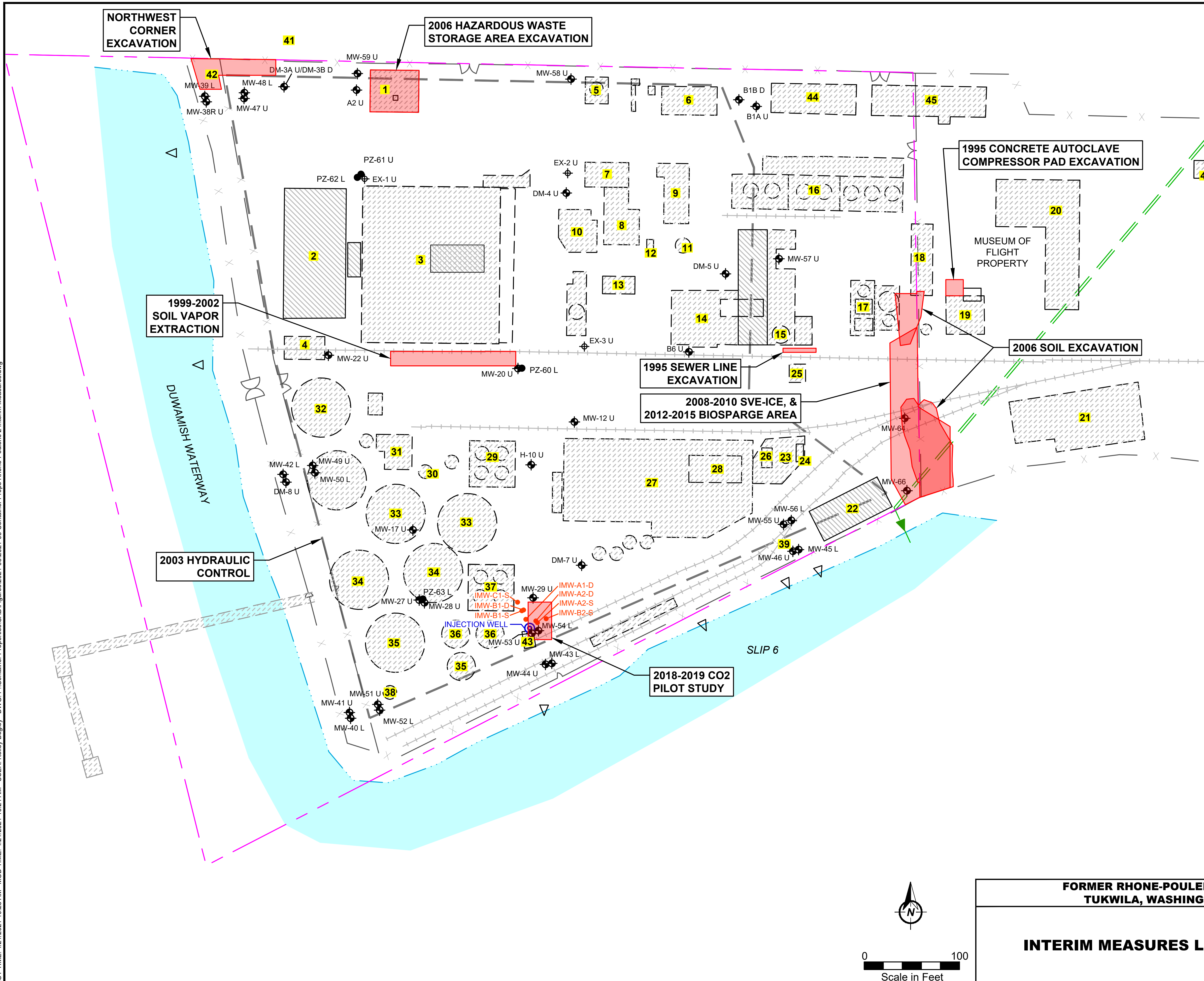
FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

Historic Structures

DOF DALTON OLMSTED FUGLEVAND

FIGURE 3

03/25/2021



LEGEND

U	UPPER ZONE MONITORING POINT
L	LOWER ZONE MONITORING POINT
D	DEEP AQUIFER MONITORING POINT
	MONITORING WELL
	EXTRACTION WELL
	PIEZOMETER
	PILOT STUDY WELLS - INJECTION MONITORING WELL - INJECTION WELL
	PROPERTY LINE
	APPROXIMATE BARRIER WALL LOCATION
X	FENCE
	KING COUNTY 36" OUTFALL
	HISTORIC STORMWATER OUTFALL
	FORMER ABOVE GROUND STRUCTURE
	FORMER BELOW GROUND STRUCTURE
	INTERIM MEASURE LOCATION

NOTE:
FIGURE 2-1 FROM AGENCY DRAFT CORRECTIVE MEASURES STUDY WORK PLAN BY AMEC ENVIRONMENT & INFRASTRUCTURE, INC. (SEPTEMBER 2014)

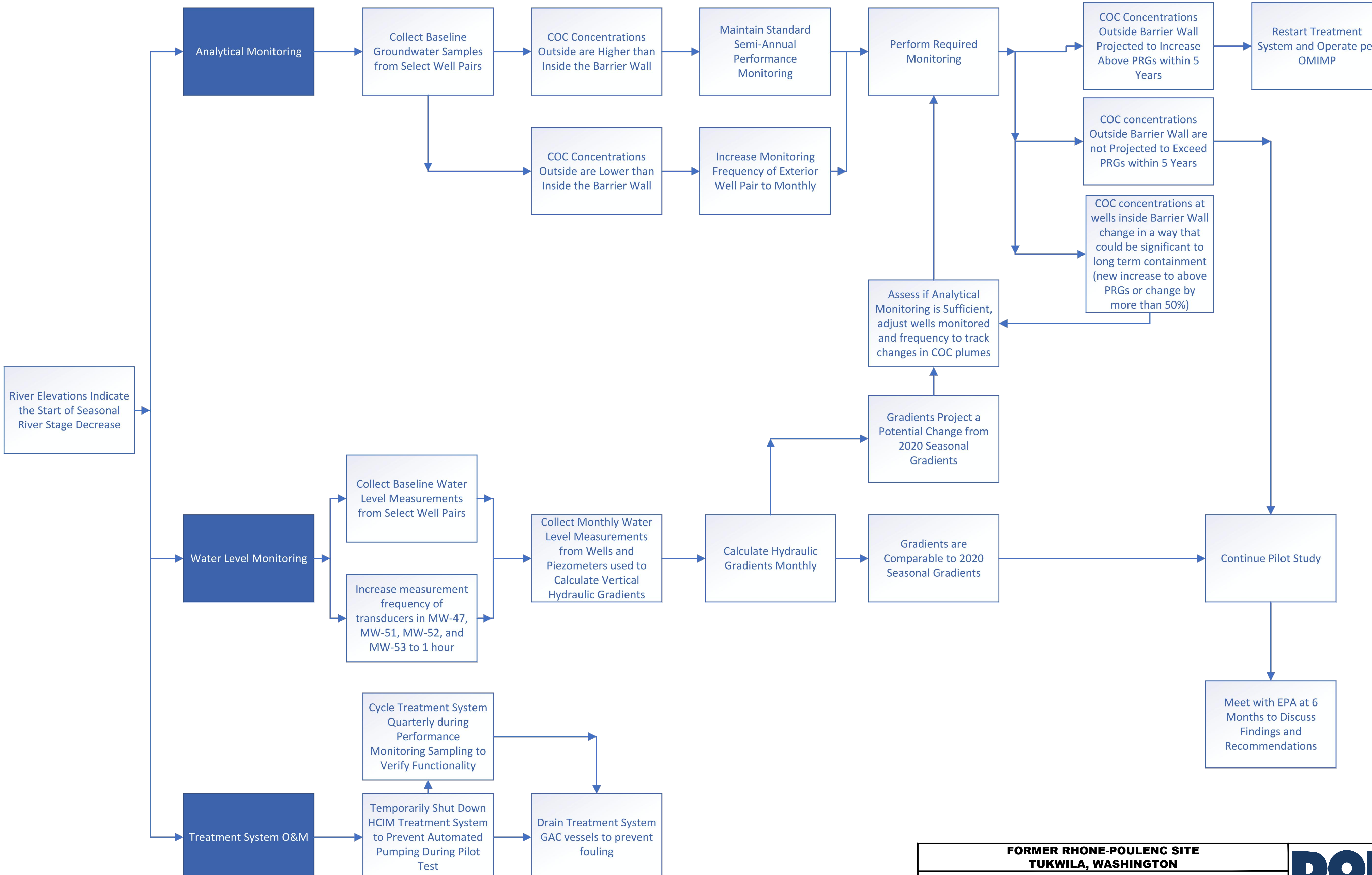
FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

DOF DALTON OLMSTED FUGLEVAND

INTERIM MEASURES LOCATIONS

FIGURE 4

04/21/2021



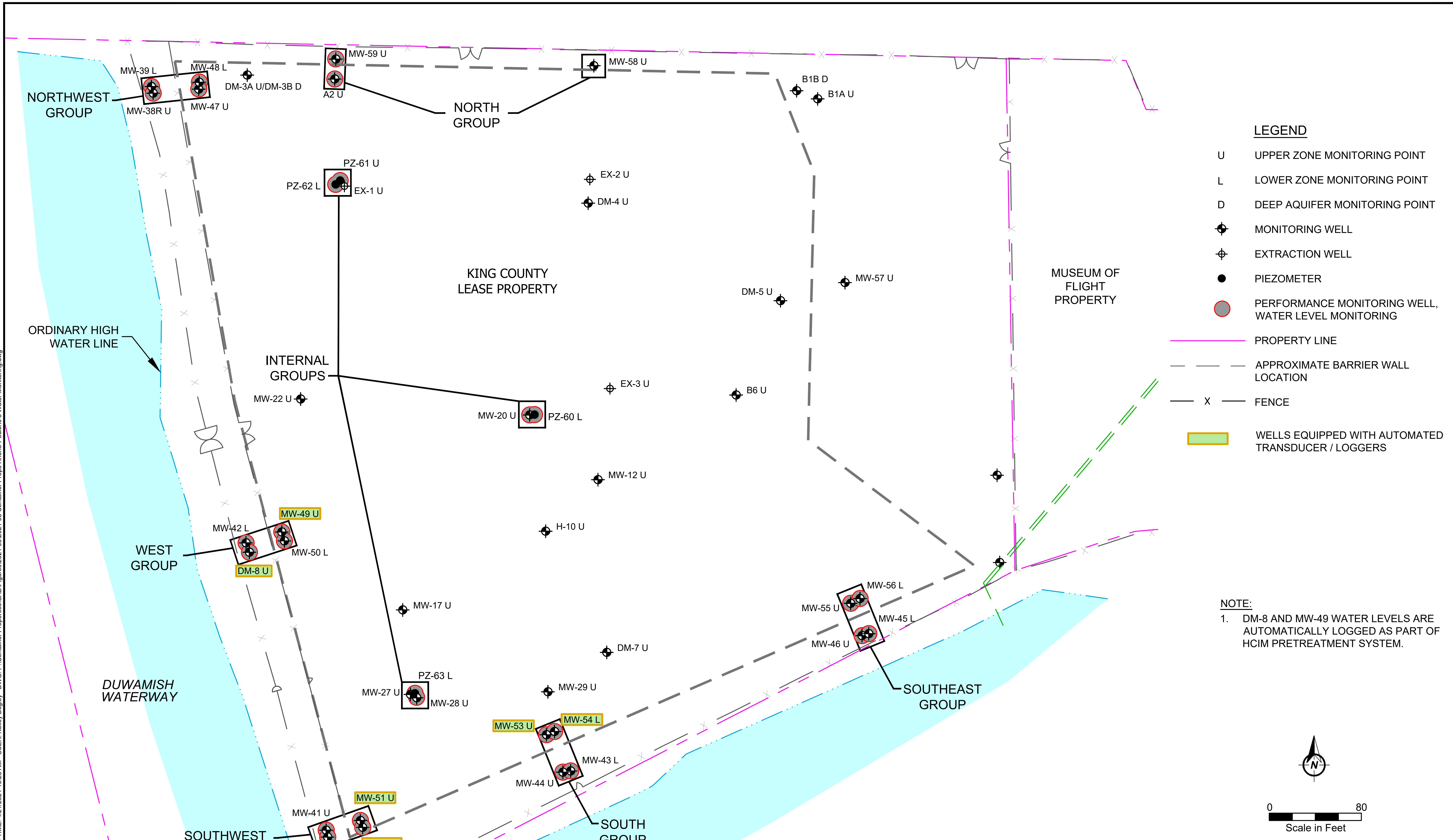
FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

ADAPTIVE MANAGEMENT FLOW CHART

DALTON OLMSTED FUGLEVAND

FIGURE 5

03/26/2021



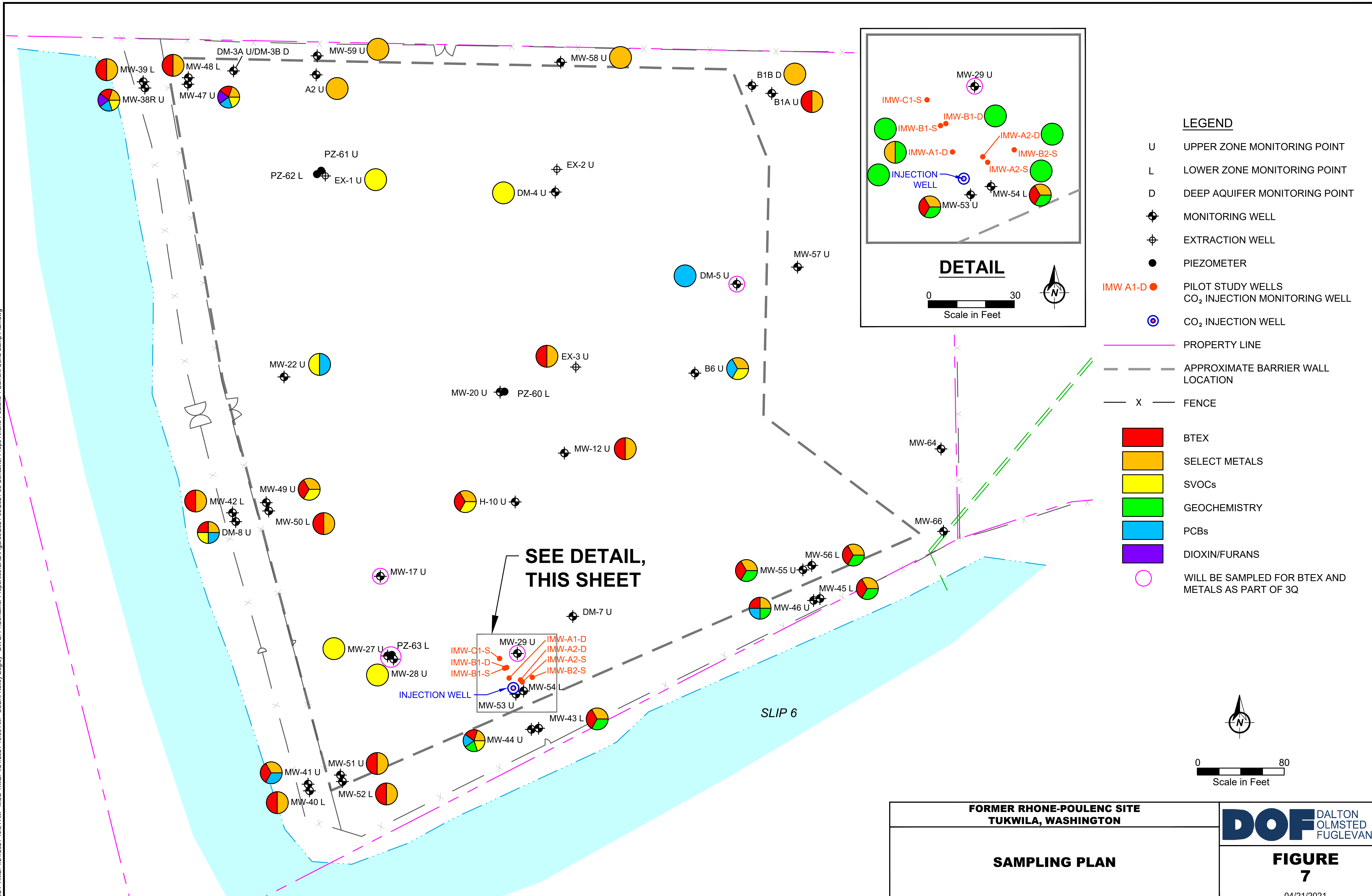
FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

WATER LEVEL MONITORING PLAN

DALTON OLMSTED FUGLEVAND

FIGURE 6

04/21/2021



FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

SAMPLING PLAN

DOF DALTON OLMSTED FUGLEVAND

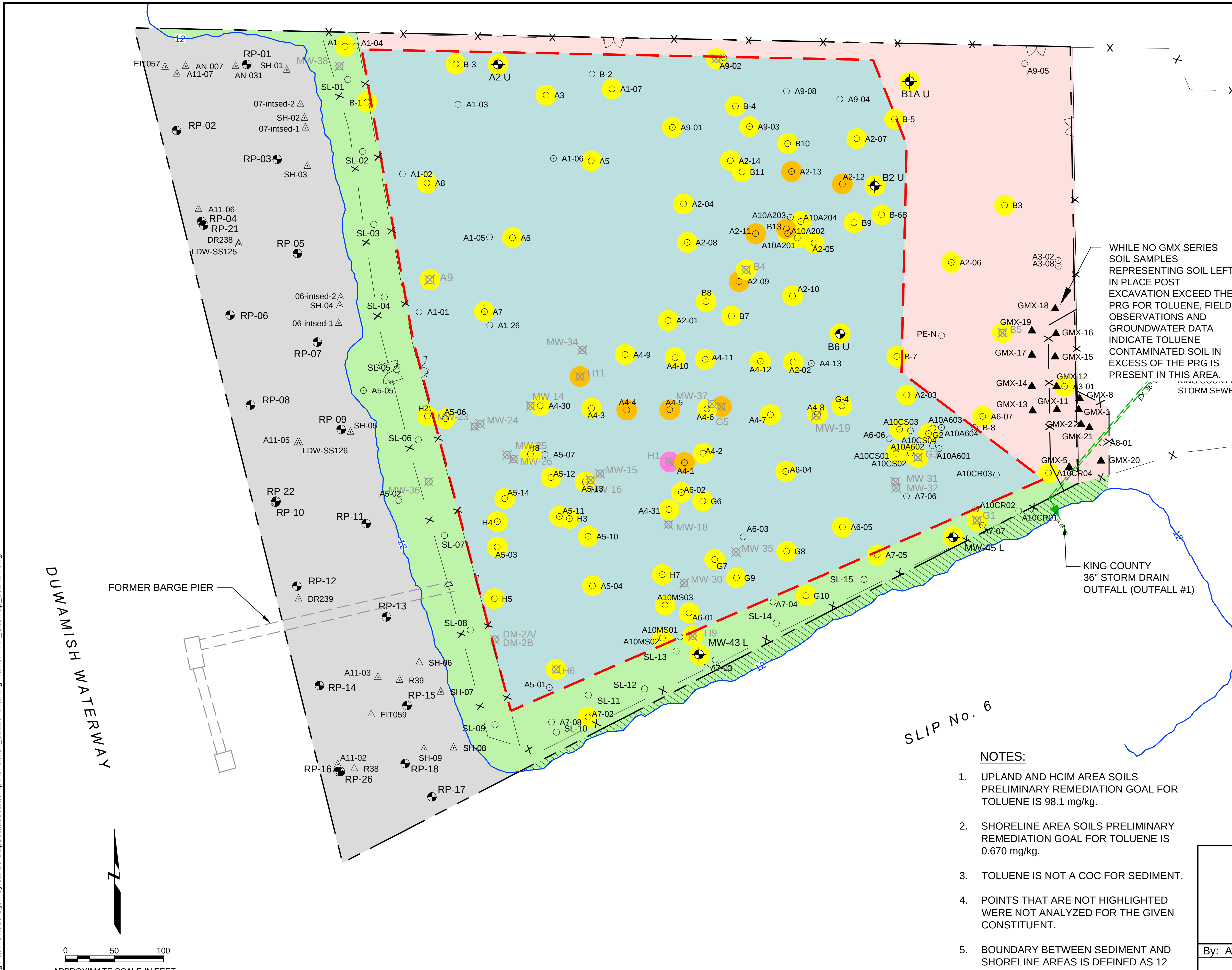
FIGURE 7

04/21/2021

PLOT TIME: 4/21/2021 10:34 AM MOD TIME: 4/21/2021 10:30 AM USER: Kelley Begley DWG: P:\Container Properties\CAD\Figures\2021-03\2021-03 Container Props Rhone-Poulenc 4 Current Cond Samp Plan.dwg

Attachment 1

Relevant 2014 Draft CMS Work Plan Maps & Technical Meeting Figures



EXPLANATION

- APPROXIMATE LOCATION OF BARRIER WALL
- PROPERTY LINE
- FENCE LINE
- KING COUNTY 36" OUTFALL
- SEDIMENT SAMPLE LOCATION
- SOIL SAMPLE LOCATION
- GMX-16 DIRECT PUSH BORING LOCATION (2006) POST EXCAVATION EXCEED THE PRG FOR TOLUENE.
- TOLUENE CONCENTRATION IS BELOW PRELIMINARY REMEDIATION GOAL (PRG)
- TOLUENE CONCENTRATION IS > PRG, BUT ≤ 10X PRG
- TOLUENE CONCENTRATION IS > 10X PRG, BUT ≤ 100X PRG
- UPLAND AREA
- HCIM AREA
- SEDIMENT AREA
- SHORELINE AREA
- SLIP 6 SHORELINE AREA OWNED BY THE BOEING COMPANY

NOTES:

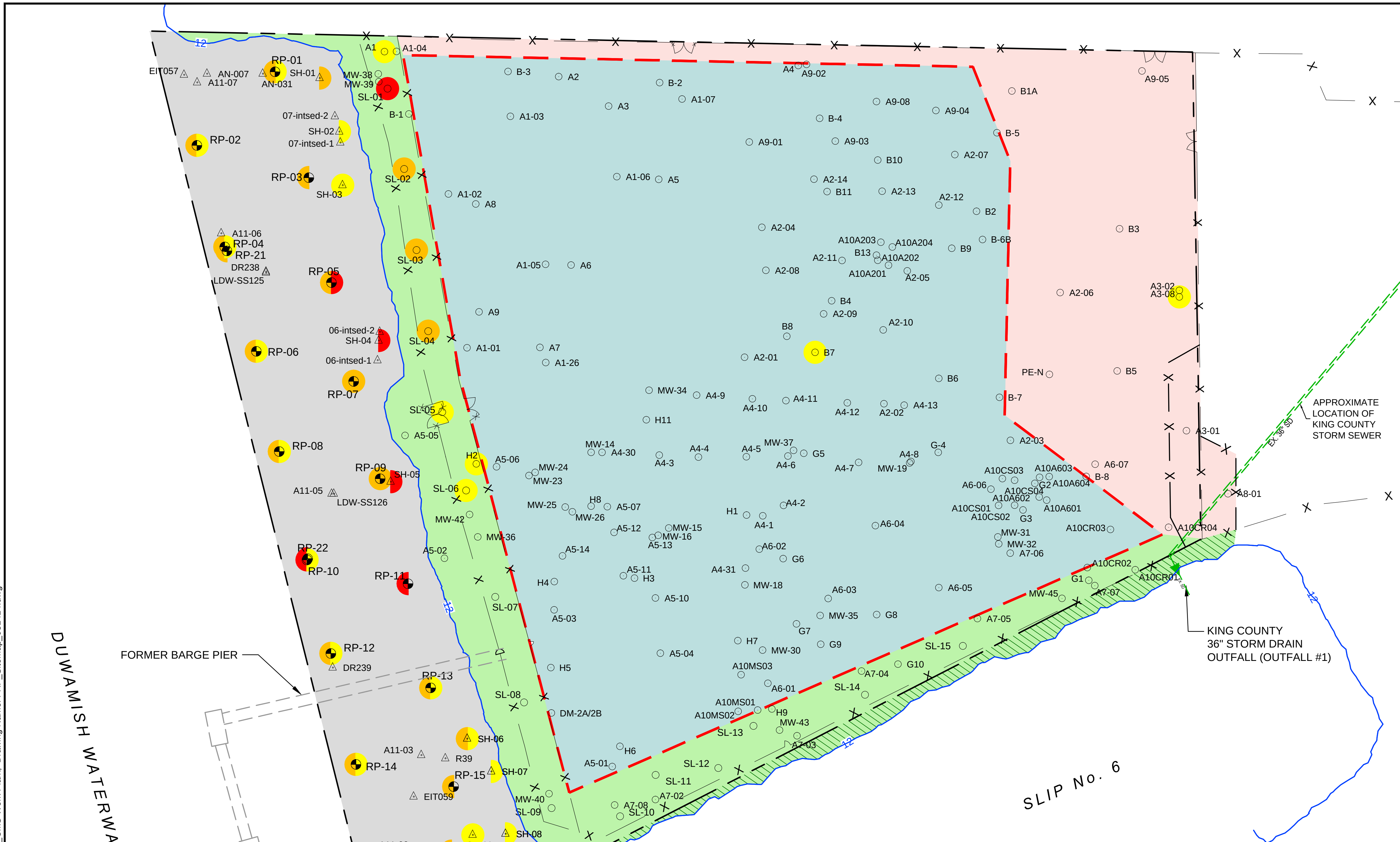
1. UPLAND AND HCIM AREA SOILS PRELIMINARY REMEDIATION GOAL FOR TOLUENE IS 98.1 mg/kg.
2. SHORELINE AREA SOILS PRELIMINARY REMEDIATION GOAL FOR TOLUENE IS 0.670 mg/kg.
3. TOLUENE IS NOT A COC FOR SEDIMENT.
4. POINTS THAT ARE NOT HIGHLIGHTED WERE NOT ANALYZED FOR THE GIVEN CONSTITUENT.
5. BOUNDARY BETWEEN SEDIMENT AND SHORELINE AREAS IS DEFINED AS 12 FEET MLLW.

TOLUENE CONCENTRATIONS IN SOIL

Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 08/28/14	Project No. 08769
amec		Figure 3-5

Plot Date: 08/28/14 - 1:46pm, Plotted by: jeffrey.sanders
Drawing Path: C:\Users\jeffrey.sanders\appdata\local\temp\AcPublish_5212\, Drawing Name: FRP_SiteMap_081414.dwg



0 50 100

APPROXIMATE SCALE IN FEET

EXPLANATION

APPROXIMATE LOCATION OF BARRIER WALL

PROPERTY LINE

FENCE LINE

KING COUNTY 36" OUTFALL

SEDIMENT SAMPLE LOCATION

SOIL SAMPLE LOCATION

PCB CONCENTRATION IS < PRELIMINARY REMEDIATION GOAL (PRG)

SOILS: PCB CONCENTRATION IS > PRG, BUT < 10X PRG

SEDIMENT: PCB CONCENTRATION IS BETWEEN THE PRG AND REMEDIAL ACTION LEVEL (RAL) FOR THE LOWER DUWAMISH WATERWAY (LDW)

SOILS: PCB CONCENTRATION IS > 10X PRG

SEDIMENT: PCB CONCENTRATION IS > RAL FOR THE LDW

UPPER INTERVAL (Top 10 cm)

LOWER INTERVAL (10-45 cm)

UPLAND AREA

HCIM AREA

SEDIMENT AREA

SHORELINE AREA

SLIP 6 SHORELINE AREA OWNED BY THE BOEING COMPANY

NOTES:

1. UPLAND AND HCIM AREAS PRELIMINARY REMEDIATION GOAL FOR PCB (AROCLOR 1254) IS 7.4 mg/kg.
2. SHORELINE AREA SOILS PRELIMINARY REMEDIATION GOAL FOR PCB IS 12 mg/kg ORGANIC CARBON. WHERE TOTAL ORGANIC CARBON DATA IS NOT AVAILABLE, OR WHEN OUTSIDE OF THE RECOMMENDED RANGE, CONCENTRATIONS WERE COMPARED WITH THE PUGET SOUND APPARENT EFFECTS THRESHOLD (AET) VALUE OF 130 µg/kg DRY WEIGHT.
3. SEDIMENT AREA PRELIMINARY REMEDIATION GOAL FOR PCB FOR 0-10 cm DEPTH INTERVAL IS 2 µg/kg AND FOR 10-45 cm DEPTH INTERVALS IS 12 mg/kg ORGANIC CARBON.
4. DATA REPORTED FOR THE LOWER INTERVAL AT LOCATION SH-5 IS NORMALIZED TO ORGANIC CARBON, EVEN THOUGH TOTAL ORGANIC CARBON WAS OUTSIDE OF RECOMMENDED RANGE.
4. POINTS THAT ARE NOT HIGHLIGHTED WERE NOT ANALYZED FOR THE GIVEN CONSTITUENT.
5. BOUNDARY BETWEEN SEDIMENT AND SHORELINE AREAS IS DEFINED AS 12 FEET MLLW.
6. IF A HALF CIRCLE IS SHOWN, THE OTHER INTERVAL WAS NOT SAMPLED, OR NOT ANALYZED.
7. SOURCES OF DATA USED TO PREPARE THIS FIGURE ARE DESCRIBED IN SECTION 2.3.1 OF THE CMS WORK PLAN.
8. PCB RAL FOR 0-10 CM DEPTH INTERVAL = 12 mg/kg ORGANIC CARBON, AND FOR 10-45 CM DEPTH INTERVAL = 65 mg/kg ORGANIC CARBON.
9. DATA REPORTED FOR THE LOWER INTERVAL FROM SAMPLES WITH 'RP-' PREFIX WAS COLLECTED FROM THE 2-3 FEET DEPTH INTERVAL.

PCB CONCENTRATIONS IN SEDIMENT AND SOIL
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 08/28/14	Project No. 08769
amec		Figure 3-7

Plot Date: 08/28/14 - 3:41pm, Plotted by: jeffrey.sanders
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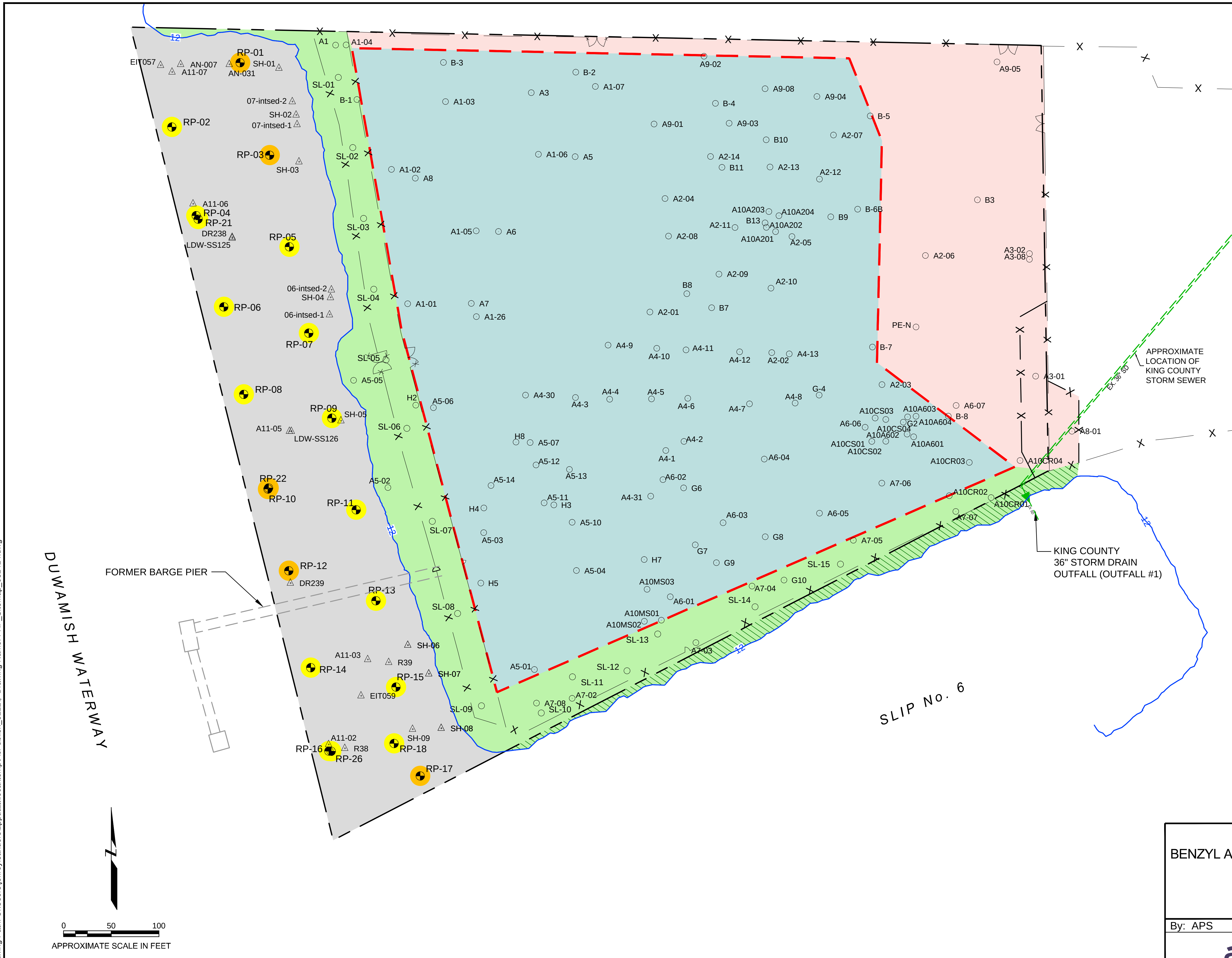

EXPLANATION

APPROXIMATE LOCATION OF BARRIER WALL

PROPERTY LINE

FENCE LINE

KING COUNTY 36" OUTFALL

SEDIMENT SAMPLE LOCATION

SOIL SAMPLE LOCATION

BENZYL ALCOHOL CONCENTRATION IS < PRELIMINARY REMEDIATION GOAL (PRG)

BENZYL ALCOHOL CONCENTRATION IS > PRG, BUT < 5X PRG

UPLAND AREA

HCIM AREA

SEDIMENT AREA

SHORELINE AREA

SLIP 6 SHORELINE AREA OWNED BY THE BOEING COMPANY

NOTES:

1. SEDIMENT AREA PRELIMINARY REMEDIATION GOAL FOR BENZYL ALCOHOL IS 57 µg/kg.
2. BENZYL ALCOHOL IS NOT A COC FOR THE HCIM, UPLANDS, OR SHORELINE AREAS.
3. POINTS THAT ARE NOT HIGHLIGHTED WERE NOT ANALYZED FOR THE GIVEN CONSTITUENT.
4. BOUNDARY BETWEEN SEDIMENT AND SHORELINE AREAS IS DEFINED AS 12 FEET MLLW.

BENZYL ALCOHOL CONCENTRATIONS IN SEDIMENT
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 08/28/14	Project No. 08769
amec		Figure 3-8

Plot Date: 08/28/14 - 1:47pm, Plotted by: jeffrey.sanders
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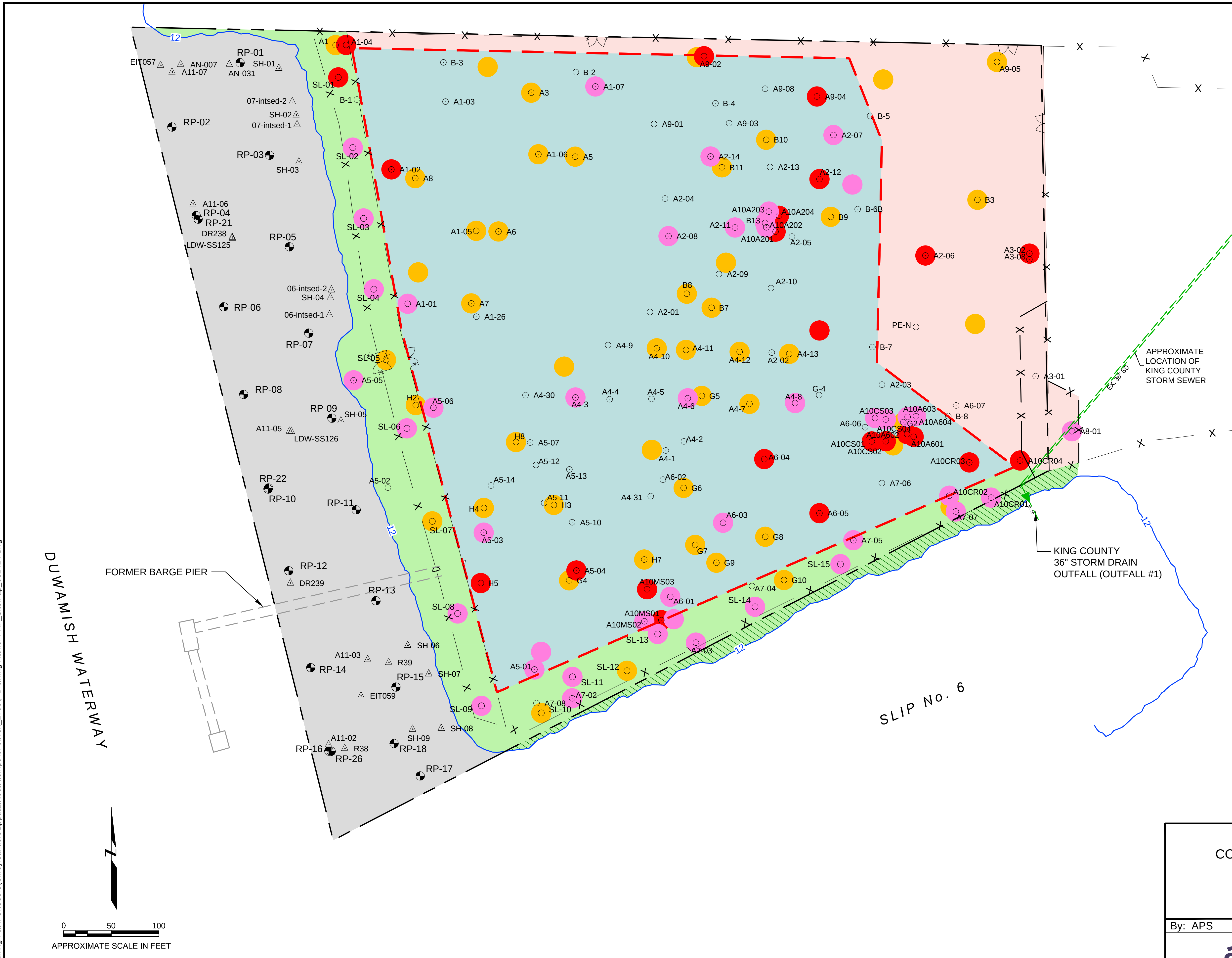

EXPLANATION

- APPROXIMATE LOCATION OF BARRIER WALL
- PROPERTY LINE
- FENCE LINE
- KING COUNTY 36" OUTFALL
- SEDIMENT SAMPLE LOCATION
- SOIL SAMPLE LOCATION
- COPPER CONCENTRATION IS ≥ PRELIMINARY REMEDIATION GOAL (PRG), BUT < 10X PRG
- COPPER CONCENTRATION IS > 10X PRG, BUT < 100X PRG
- COPPER CONCENTRATION IS > 100X PRG
- UPLAND AREA
- HCIM AREA
- SEDIMENT AREA
- SHORELINE AREA
- SLIP 6 SHORELINE AREA OWNED BY THE BOEING COMPANY

NOTES:

1. UPLAND, HCIM, AND SHORELINE AREA SOILS PRELIMINARY REMEDIATION GOAL FOR COPPER IS 3.55 mg/kg.
2. COPPER IS NOT A SEDIMENT COC.
3. POINTS THAT ARE NOT HIGHLIGHTED WERE NOT ANALYZED FOR THE GIVEN CONSTITUENT.
4. BOUNDARY BETWEEN SEDIMENT AND SHORELINE AREAS IS DEFINED AS 12 FEET MLLW.
5. SOURCES OF DATA USED TO PREPARE THIS FIGURE ARE DESCRIBED IN SECTION 2.3.1 OF THE CMS WORK PLAN.

COPPER CONCENTRATIONS IN SOIL
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 08/27/14	Project No. 08769
amec		Figure 3-11

Plot Date: 08/27/14 - 12:31pm, Plotted by: jeffrey.sanders
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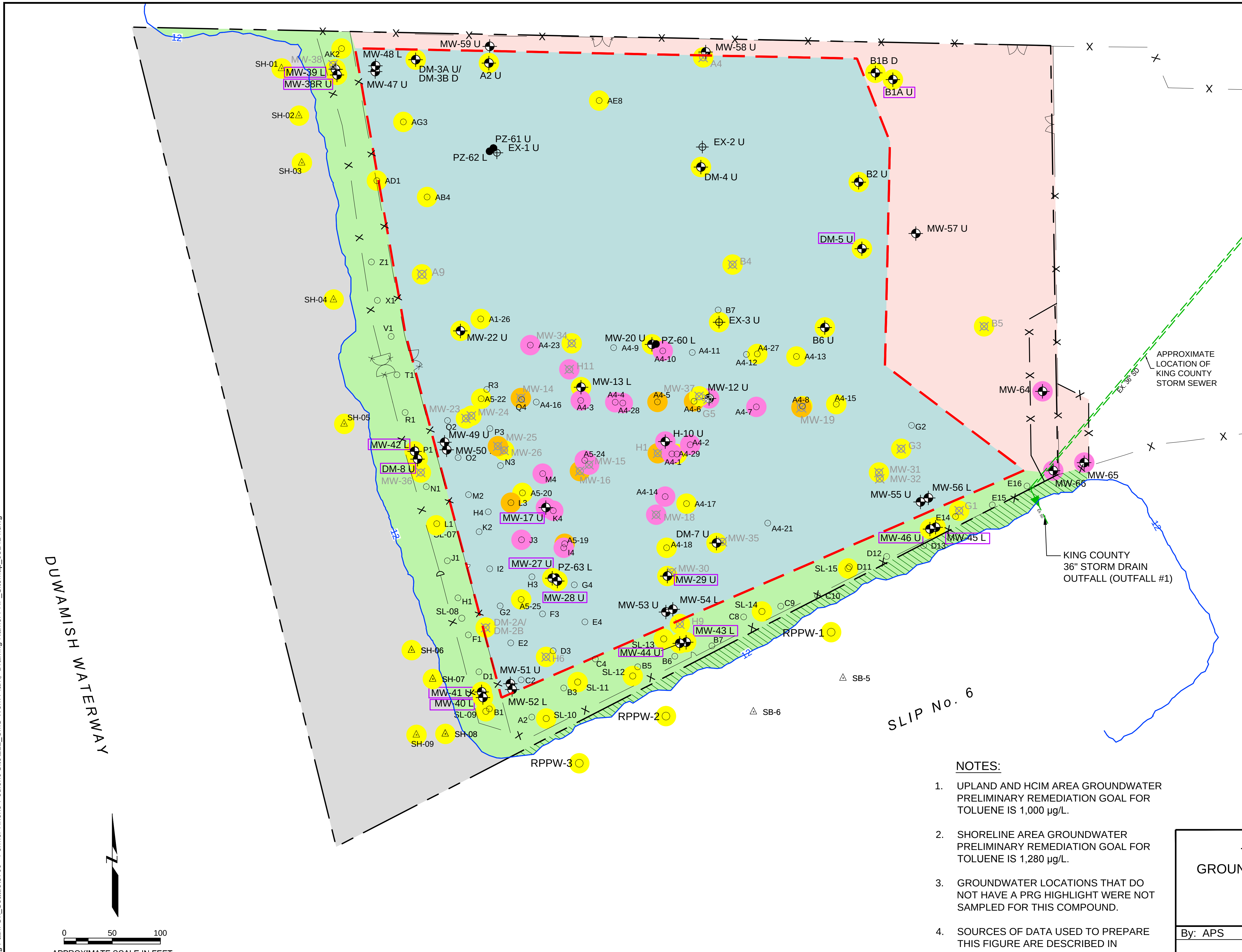

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EXPLANATION

- APPROXIMATE LOCATION OF BARRIER WALL
- PROPERTY LINE
- FENCE LINE
- KING COUNTY 36" OUTFALL
- MONITORING WELL LOCATION
- EXTRACTION WELL LOCATION
- PIEZOMETER LOCATION
- GROUNDWATER SAMPLING LOCATION
- PORE WATER SAMPLING LOCATION
- ABANDONED WELL
- TOLUENE CONCENTRATION IS < PRELIMINARY REMEDIATION GOAL (PRG)
- TOLUENE CONCENTRATION IS < 10X PRG
- TOLUENE CONCENTRATION IS BETWEEN 10X AND 100X PRG
- MONITORING WELL IS PART OF THE ACTIVE MONITORING NETWORK

U UPPER ZONE MONITORING POINT

L LOWER ZONE MONITORING POINT

D DEEP AQUIFER MONITORING POINT

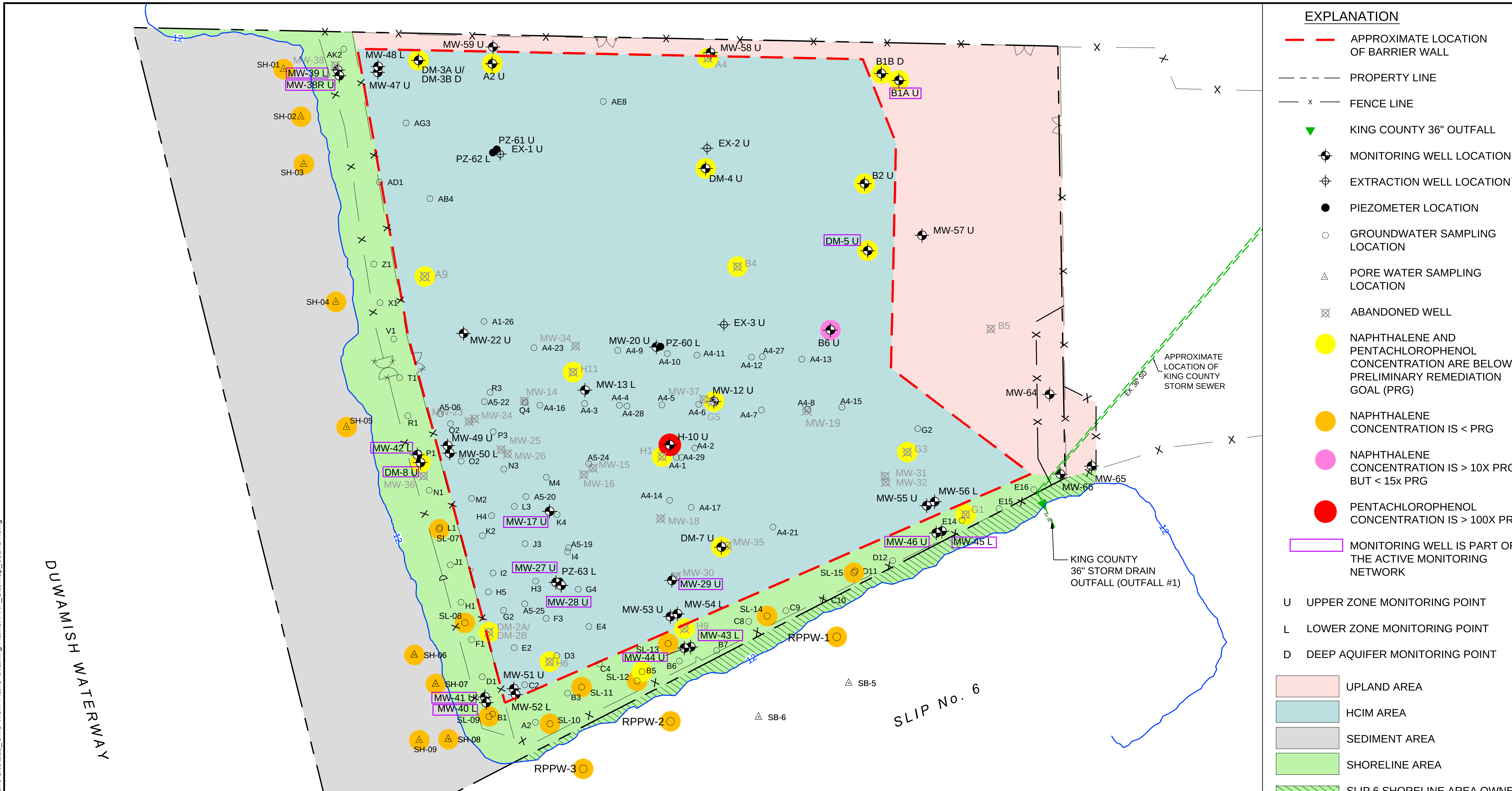
- UPLAND AREA
- HCIM AREA
- SEDIMENT AREA
- SHORELINE AREA
- SLIP 6 SHORELINE AREA OWNED BY THE BOEING COMPANY

NOTES:

1. UPLAND AND HCIM AREA GROUNDWATER PRELIMINARY REMEDIATION GOAL FOR TOLUENE IS 1,000 µg/L.
2. SHORELINE AREA GROUNDWATER PRELIMINARY REMEDIATION GOAL FOR TOLUENE IS 1,280 µg/L.
3. GROUNDWATER LOCATIONS THAT DO NOT HAVE A PRG HIGHLIGHT WERE NOT SAMPLED FOR THIS COMPOUND.
4. SOURCES OF DATA USED TO PREPARE THIS FIGURE ARE DESCRIBED IN SECTION 2.3.2 OF THE CMS WORK PLAN.

TOLUENE CONCENTRATIONS IN GROUNDWATER AND POREWATER SAMPLES
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 08/28/14	Project No. 08769
amec		Figure 3-14



0 50 100

APPROXIMATE SCALE IN FEET

NOTES:

1. UPLAND AND HCIM AREA GROUNDWATER PRELIMINARY REMEDIATION GOAL FOR NAPHTHALENE IS 0.14 µg/L.
2. SHORELINE AREA GROUNDWATER PRELIMINARY REMEDIATION GOAL FOR NAPHTHALENE IS 25.6 µg/L.
3. GROUNDWATER PRELIMINARY REMEDIATION GOAL FOR PENTACHLOROPHENOL IS 0.00344 µg/L.
4. GROUNDWATER LOCATIONS THAT DO NOT HAVE A PRG HIGHLIGHT WERE NOT SAMPLED FOR THIS COMPOUND.
5. SOURCES OF DATA USED TO PREPARE THIS FIGURE ARE DESCRIBED IN SECTION 2.3.2 OF THE CMS WORK PLAN.

NAPHTHALENE AND PENTACHLOROPHENOL CONCENTRATIONS IN GROUNDWATER AND POREWATER SAMPLES
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 08/28/14	Project No. 08769
amec		Figure 3-17

Plot Date: 08/28/14 - 2:10pm, Plotted by: jeffrey.sanders
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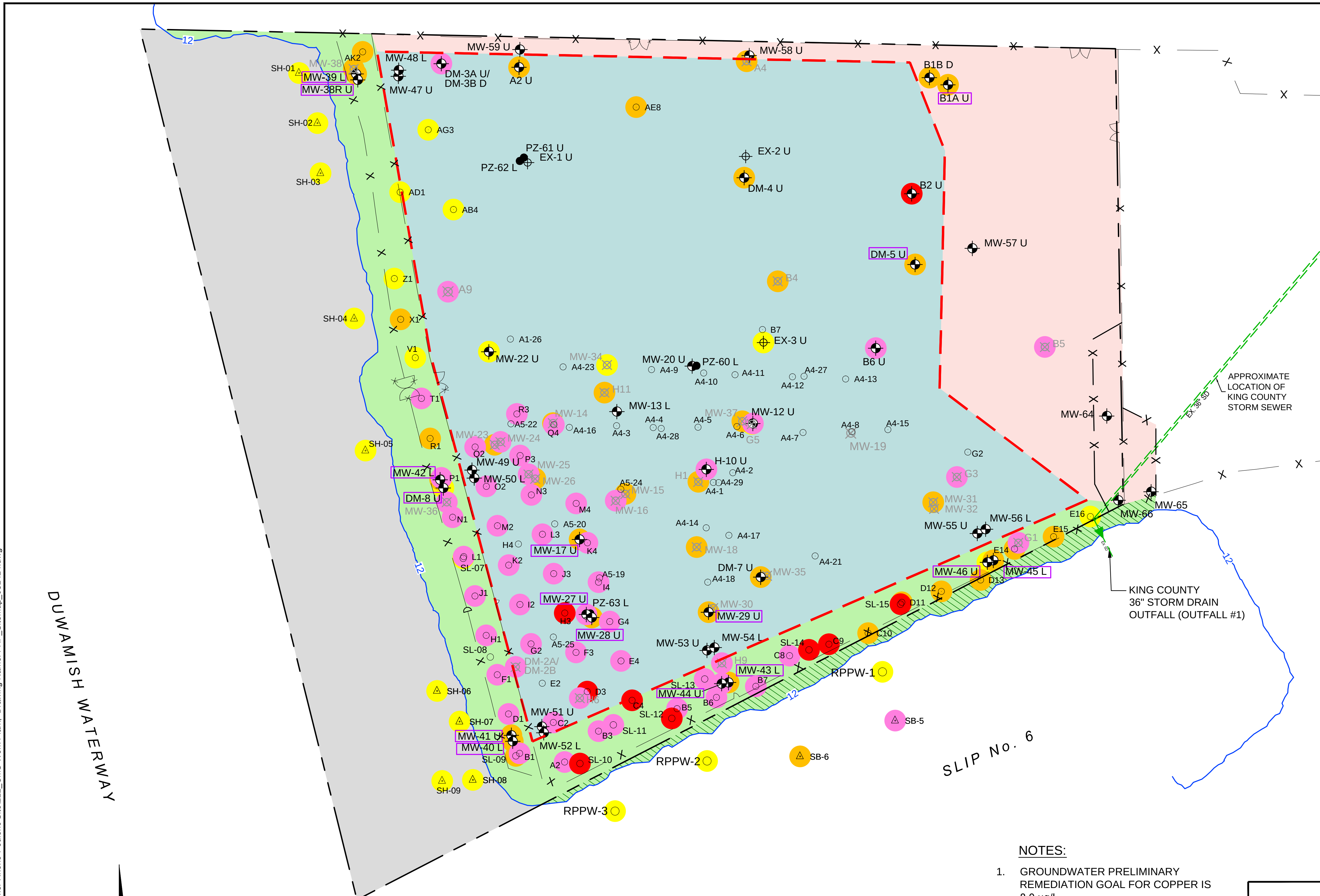


APPROXIMATE SCALE IN FEET (0, 50, 100)

EXPLANATION

- APPROXIMATE LOCATION OF BARRIER WALL
- PROPERTY LINE
- FENCE LINE
- KING COUNTY 36" OUTFALL
- MONITORING WELL LOCATION
- EXTRACTION WELL LOCATION
- PIEZOMETER LOCATION
- GROUNDWATER SAMPLING LOCATION
- PORE WATER SAMPLING LOCATION
- ABANDONED WELL
- COPPER CONCENTRATION IS < PRELIMINARY REMEDIATION GOAL (PRG)
- COPPER CONCENTRATION IS < 10X PRG
- COPPER CONCENTRATION IS BETWEEN 10X AND 100X PRG
- COPPER CONCENTRATION IS > 100X PRG
- MONITORING WELL IS PART OF THE ACTIVE MONITORING NETWORK

U UPPER ZONE MONITORING POINT
L LOWER ZONE MONITORING POINT
D DEEP AQUIFER MONITORING POINT

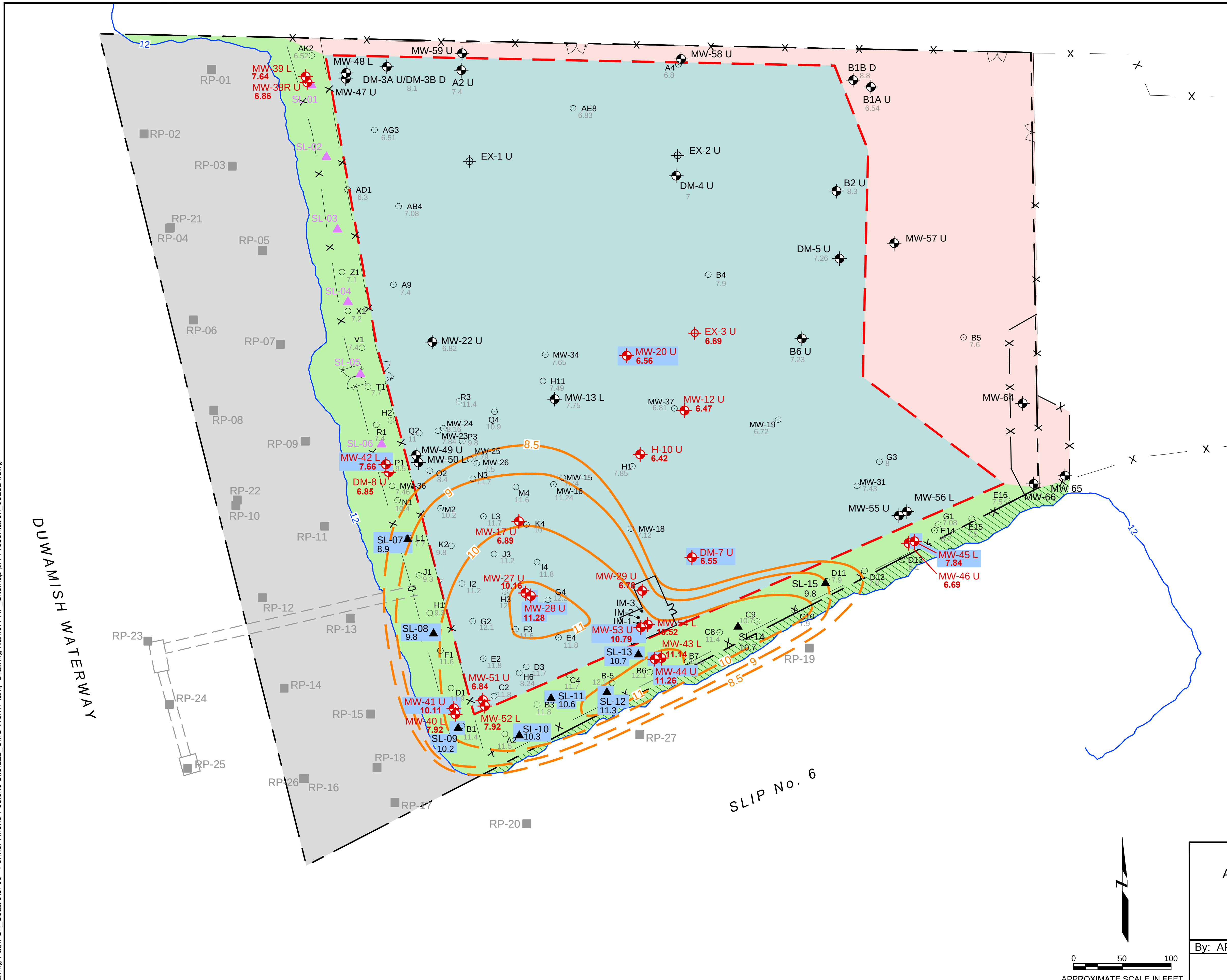
- UPLAND AREA
- HCIM AREA
- SEDIMENT AREA
- SHORELINE AREA
- SLIP 6 SHORELINE AREA OWNED BY THE BOEING COMPANY

NOTES:

1. GROUNDWATER PRELIMINARY REMEDIATION GOAL FOR COPPER IS 8.0 µg/L.
2. GROUNDWATER LOCATIONS THAT DO NOT HAVE A PRG HIGHLIGHT WERE NOT SAMPLED FOR THIS COMPOUND.
3. SOURCES OF DATA USED TO PREPARE THIS FIGURE ARE DESCRIBED IN SECTION 2.3.2 OF THE CMS WORK PLAN.

COPPER CONCENTRATIONS IN GROUNDWATER AND POREWATER SAMPLES
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 08/27/14	Project No. 08769
amec		Figure 3-21



EXPLANATION

- PROPERTY LINE
- APPROXIMATE LOCATION OF BARRIER WALL
- FENCE
- ELEVATION CONTOUR (MLLW)
- SL-08 9.8 — SHORELINE AREA GROUNDWATER SAMPLING LOCATION, 2011
- HISTORIC GROUNDWATER SAMPLING LOCATION
- 7.9 — HISTORIC GROUNDWATER pH MEASUREMENT (BEFORE 2008)
- GROUNDWATER pH CONTOUR (DASHED WHERE INFERRED)
- MW-45 L 7.84 — HIGHLIGHTED SAMPLE LOCATIONS USED TO GENERATE pH CONTOURS
- MW-54 L 10.52 — pH VALUE IS MAXIMUM OBSERVED FROM MARCH 2008 TO PRESENT
- IM-1 — PROPOSED CO_2 MONITORING WELL
- SHORELINE AREA SOIL SAMPLING LOCATION
- SEDIMENT AREA SAMPLING LOCATION

MONITORING WELL NETWORK

- MONITORING WELL LOCATION
- EXTRACTION WELL LOCATION
- U — UPPER ZONE MONITORING POINT
- L — LOWER ZONE MONITORING POINT

KEY

- UPLAND AREA
- HCIM AREA
- SEDIMENT AREA
- SHORELINE AREA
- SLIP 6 SHORELINE AREA OWNED BY THE BOEING COMPANY

APPROXIMATE EXTENT OF HIGH pH AREA
Former Rhone-Poulenc Site
Tukwila, Washington

By: APS	Date: 08/28/14	Project No. 08769
amec		Figure 3-28

Plot Date: 08/28/14 - 3:52pm, Plotted by: jeffrey.sanders
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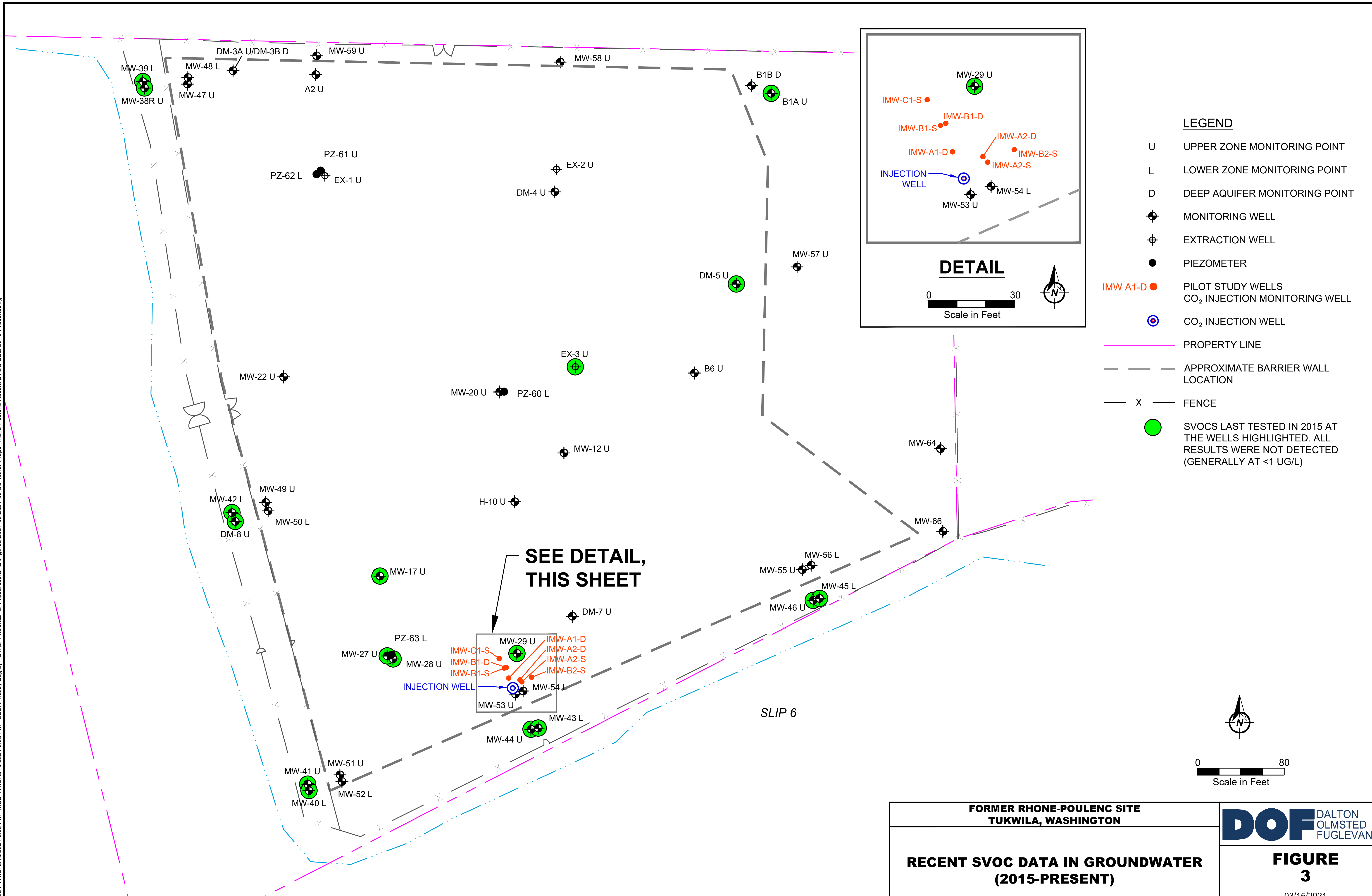


FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

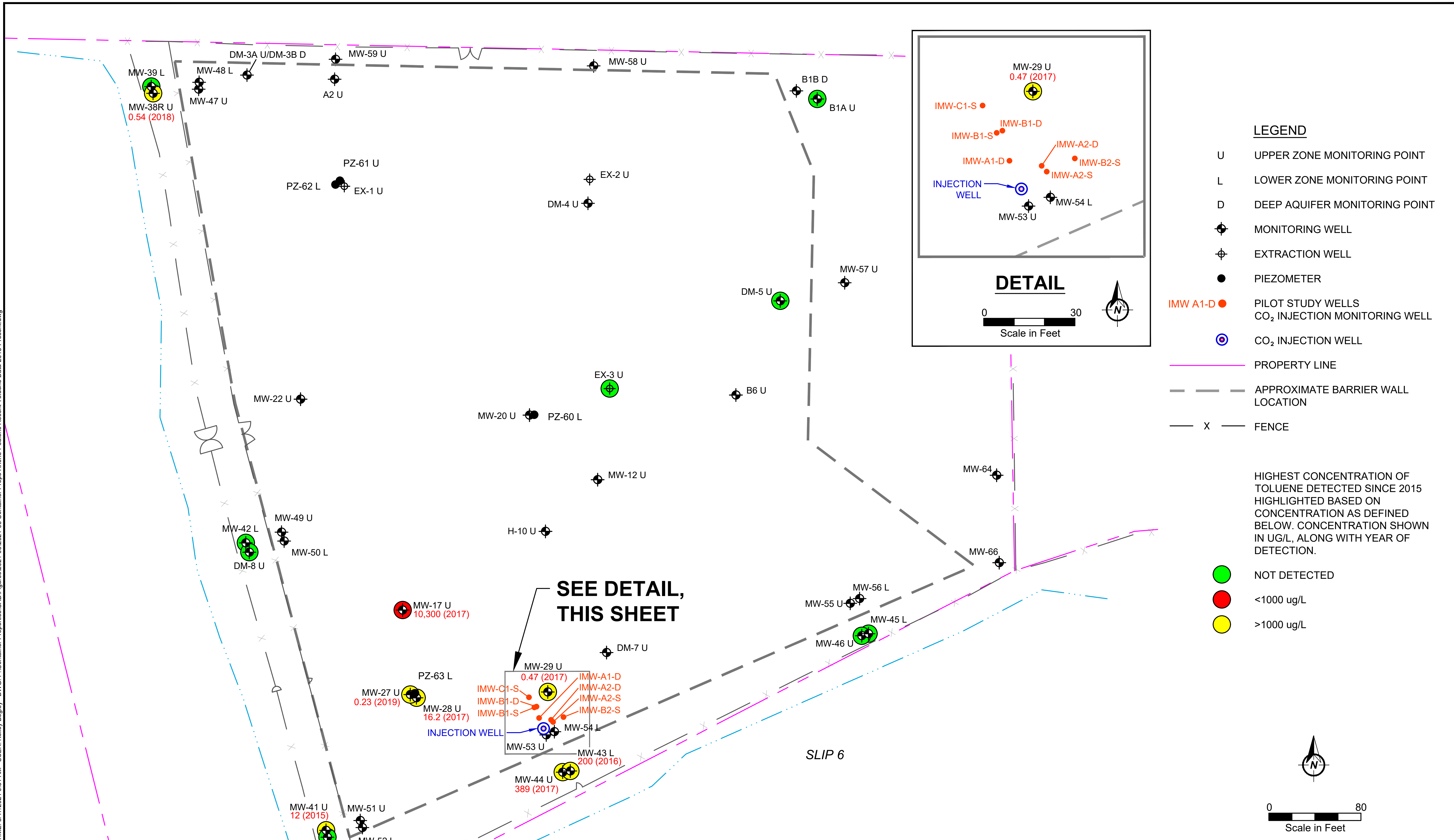
RECENT SVOC DATA IN GROUNDWATER (2015-PRESENT)

DOF DALTON OLMSTED FUGLEVAND

FIGURE 3

03/15/2021

PLOT TIME: 3/16/2021 5:39 PM MOD TIME: 3/16/2021 5:38 PM USER: Kelley Begley DWG: P:\Container Properties\CAD\Figures\2021-03\2021-03 Container Props Rhone-Poulenc Recent SVOC Data-2015-Present.dwg



FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

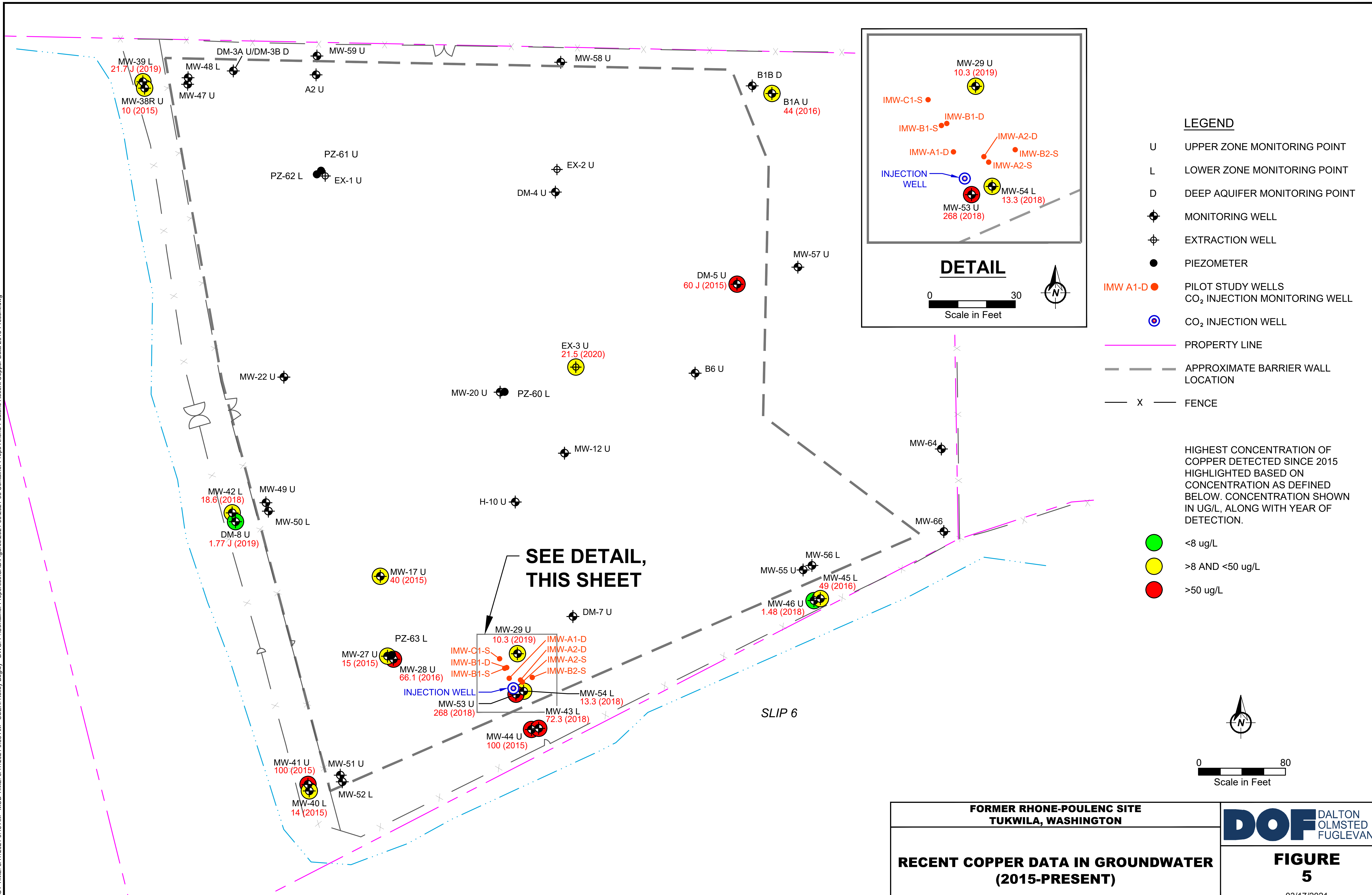
DOF DALTON OLMSTED FUGLEVAND

RECENT TOLUENE DATA IN GROUNDWATER (2015-PRESENT)

FIGURE 4

03/17/2021

PLOT TIME: 3/17/2021 9:52 AM MOD TIME: 3/17/2021 9:51 AM USER: Kelley Begley DWG: P:\Container Properties\CAD\Figures\2021-03\2021-03 Container Props Rhone-Poulenc Recent Toluene Data-2015-Present.dwg



FORMER RHONE-POULENC SITE
TUKWILA, WASHINGTON

RECENT COPPER DATA IN GROUNDWATER (2015-PRESENT)

DOF DALTON OLMSTED FUGLEVAND

FIGURE 5

03/17/2021

PLOT TIME: 3/17/2021 9:48 AM MOD TIME: 3/17/2021 9:38 AM USER: Kelley Begley DWG: P:\Container Properties\CAD\Figures\2021-03\2021-03 Container Props Rhone-Poulenc Recent Copper Data-2015-Present.dwg

Attachment 2

List of Hazardous Constituents and Maximum Concentrations (provided by EPA)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1				**Groundwater to Protect Drinking Water***						**Groundwater to Protect Surface Water - Aquatic Life***			
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER**	**CAS #**	**Chemical Data Group**	**MCL** (µg/L)	**Tap Water RSL** (µg/L)	Tap Water RSL Key	**Lowest of Groundwater to Protect Drinking Water Values (columns D-E) (µg/L)**	**Rationale**		**Aquatic Life Fresh/Chronic** CWA §304 (EPA AWQC) (µg/L)	**Aquatic Life Marine/Chronic** CWA §304 (EPA AWQC) (µg/L)	**Aquatic Life Fresh/Chronic** 173-201A WAC (WA State WQS) (µg/L)	**Aquatic Life Marine/Chronic** 173-201A WAC (WA State WQS) (µg/L)
3	acenaphthene	83-32-9	PAHs		5.3E+02	noncancer	5.3E+02	RSL noncancer					
4	acenaphthylene	208-96-8	PAHs										
5	acetone	67-64-1	VOCs		1.4E+04	noncancer	1.4E+04	RSL noncancer					
6	aldrin (see notes re: aldrin and dieldrin)	309-00-2	Pesticides		9.2E-04	cancer	9.2E-04	RSL cancer				1.9E-03	1.9E-03
7	aluminum	7429-90-5	Metals		2.0E+04	noncancer	2.0E+04	RSL noncancer					
8	anthracene	120-12-7	PAHs		1.8E+03	noncancer	1.8E+03	RSL noncancer					
9	antimony (metallic)	7440-36-0	Metals	6.0E+00	7.8E+00	noncancer	6.0E+00	MCL					
10	aroclor 1254	11097-69-1	PCBs		7.8E-03	cancer	7.8E-03	RSL cancer					
11	aroclor 1260	11096-82-5	PCBs		7.8E-03	cancer	7.8E-03	RSL cancer					
12	arsenic, inorganic	7440-38-2	Metals	1.0E+01	5.2E-02	cancer	5.2E-02	RSL cancer		1.5E+02	3.6E+01	1.9E+02	3.6E+01
13	barium and compounds	7440-39-3	Metals	2.0E+03	3.8E+03	noncancer	2.0E+03	MCL					
14	benzene	71-43-2	VOCs	5.0E+00	4.6E-01	cancer	4.6E-01	RSL cancer					
15	benzo[a]anthracene	56-55-3	cPAHs		3.0E-02	cancer	3.0E-02	RSL cancer					
16	benzo[a]pyrene	50-32-8	cPAHs	2.0E-01	2.5E-02	cancer	2.5E-02	RSL cancer					
17	benzo[b]fluoranthene	205-99-2	cPAHs		2.5E-01	cancer	2.5E-01	RSL cancer					
18	benzo[g,h,i]perylene	191-24-2	PAHs										
19	benzo[k]fluoranthene	207-08-9	cPAHs		2.5E+00	cancer	2.5E+00	RSL cancer					
20	benzoic acid	65-85-0	SVOCs		7.5E+04	noncancer	7.5E+04	RSL noncancer					
21	benzyl alcohol	100-51-6	SVOCs		2.0E+03	noncancer	2.0E+03	RSL noncancer					
22	beryllium	7440-41-7	Metals	4.0E+00	2.5E+01	noncancer	4.0E+00	MCL					
23	bis(2-ethylhexyl)-phthalate	117-81-7	Phthalates	6.0E+00	5.6E+00	cancer	5.6E+00	RSL cancer					
24	bromoform	75-25-2	VOCs	8.0E+01	3.3E+00	cancer	3.3E+00	RSL cancer					
25	butyl benzyl phthalate	85-68-7	Phthalates		1.6E+01	cancer	1.6E+01	RSL cancer					
26	butylbenzene; sec-	135-98-8	VOCs		2.0E+03	noncancer	8.0E+02	RSL noncancer					
27	cadmium (food/diet)	7440-43-9	Metals								7.9E+00		9.3E+00
28	cadmium (water) (see notes re: hardness)	7440-43-9	Metals	5.0E+00	9.2E+00	noncancer	5.0E+00	MCL		2.1E+00	7.9E+00	2.9E+00	9.3E+00
29	calcium	203863-17-6	Metals										
30	carbazole	86-74-8	PAHs										
31	carbon disulfide	75-15-0	VOCs		8.1E+02	noncancer	8.1E+02	RSL noncancer					
32	chlordane (technical)	12789-03-6	Pesticides	2.0E+00	2.0E-02	cancer	2.0E-02	RSL cancer		4.3E-03	4.0E-03		
33	chlordane	57-74-9	Pesticides									4.3E-03	4.0E-03
34	chromium (III), insoluble salts (see notes re: hardness)	16065-83-1	Metals		2.2E+04	noncancer	2.2E+04	RSL noncancer		2.3E+02		5.5E+02	
35	chromium (total)	7440-47-3	Metals	1.0E+02			1.0E+02	MCL					
36	chromium (VI)	18540-29-9	Metals		3.5E-02	cancer	3.5E-02	RSL cancer		1.1E+01	5.0E+01	1.0E+01	5.0E+01
37	chrysene	218-01-9	cPAHs		2.5E+01	cancer	2.5E+01	RSL cancer					
38	cobalt	7440-48-4	Metals		6.0E+00	cancer	6.0E+00	RSL cancer					
39	copper (see notes re: hardness)	7440-50-8	Metals	1.3E+03	8.0E+02	noncancer	8.0E+02	RSL noncancer		2.9E+01	3.1E+00	3.7E+01	3.1E+00

	A	B	C	D	E	F	G	H	I	J	K	L	M
1				**Groundwater to Protect Drinking Water***						**Groundwater to Protect Surface Water - Aquatic Life***			
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER**	**CAS #**	**Chemical Data Group**	**MCL** (µg/L)	**Tap Water RSL** (µg/L)	Tap Water RSL Key	**Lowest of Groundwater to Protect Drinking Water Values (columns D-E) (µg/L)**	**Rationale**		**Aquatic Life Fresh/Chronic** CWA §304 (EPA AWQC) (µg/L)	**Aquatic Life Marine/Chronic** CWA §304 (EPA AWQC) (µg/L)	**Aquatic Life Fresh/Chronic** 173-201A WAC (WA State WQS) (µg/L)	**Aquatic Life Marine/Chronic** 173-201A WAC (WA State WQS) (µg/L)
40	DDD, 4,4'-	72-54-8	Pesticides		3.2E-02	cancer	3.2E-02	RSL cancer					
41	DDE, 4,4'-	72-55-9	Pesticides		4.6E-02	cancer	4.6E-02	RSL cancer					
42	DDT, 4,4'-	50-29-3	Pesticides		2.3E-01	cancer	2.3E-01	RSL cancer		1.0E-03	1.0E-03	1.0E-03	1.0E-03
43	dibenz[a,h]anthracene	53-70-3	cPAHs		2.5E-02	cancer	2.5E-02	RSL cancer					
44	dibenzofuran	132-64-9	PAHs		7.9E+00	noncancer	7.9E+00	RSL noncancer					
45	dichlorobenzene; 1,2-	95-50-1	VOCs	6.0E+02	3.0E+02	noncancer	3.0E+02	RSL noncancer					
46	dichlorobenzene; 1,4-	106-46-7	VOCs	7.5E+01	4.8E-01	cancer	4.8E-01	RSL cancer					
47	dichloroethylene; 1,2-,cis	156-59-2	VOCs	7.0E+01	3.6E+01	noncancer	3.6E+01	RSL noncancer					
48	dieldrin (see notes re: aldrin and dieldrin)	60-57-1	Pesticides		1.8E-03	cancer	1.8E-03	RSL cancer		5.6E-02	1.9E-03	1.9E-03	1.9E-03
49	diethyl phthalate	84-66-2	Phthalates		1.5E+04	noncancer	1.5E+04	RSL noncancer					
50	dimethylphenol; 2,4-	105-67-9	Phenols		3.6E+02	noncancer	3.6E+02	RSL noncancer					
51	dimethyl phthalate	131-11-3	Phthalates										
52	di-n-butyl-phthalate (dibutyl phthalate)	84-74-2	Phthalates		9.0E+02	noncancer	9.0E+02	RSL noncancer					
53	di-n-octyl phthalate	117-84-0	Phthalates		2.0E+02	noncancer	2.0E+02	RSL noncancer					
54	endosulfan	115-29-7	Pesticides		1.0E+02	noncancer	1.0E+02	RSL noncancer				5.6E-02	8.7E-03
55	endosulfan I (alpha)	959-98-8	Pesticides							5.6E-02	8.7E-03		
56	endosulfan II (beta)	33213-65-9	Pesticides							5.6E-02	8.7E-03		
57	endosulfan sulfate	1031-07-8	Pesticides		1.1E+02	noncancer	1.1E+02	RSL noncancer					
58	endrin	72-20-8	Pesticides	2.0E+00	2.3E+00	noncancer	2.0E+00	MCL		3.6E-02	2.3E-03	2.3E-03	2.3E-03
59	endrin aldehyde	7421-93-4	Pesticides										
60	endrin ketone	53494-70-5	Pesticides										
61	ethylbenzene	100-41-4	VOCs	7.0E+02	1.5E+00	cancer	1.5E+00	RSL cancer					
62	fluoranthene	206-44-0	PAHs		8.0E+02	noncancer	8.0E+02	RSL noncancer					
63	fluorene	86-73-7	PAHs		2.9E+02	noncancer	2.9E+02	RSL noncancer					
64	formaldehyde	50-00-0	VOCs		3.9E-01	cancer	3.9E-01	RSL cancer					
65	hexachlorobenzene	118-74-1	Pesticides	1.0E+00	9.8E-03	cancer	9.8E-03	RSL cancer					
66	hexachlorocyclohexane, delta- (delta-BHC)	319-86-8	Pesticides										
67	indeno[1,2,3-cd]pyrene	193-39-5	cPAHs		2.5E-01	cancer	2.5E-01	RSL cancer					
68	iron	7439-89-6	Metals		1.4E+04	noncancer	1.4E+04	RSL noncancer		1.0E+03			
69	isopropyltoluene, 4- (cymene, p-)	99-87-6	VOCs										
70	lead (see notes re: hardness)	7439-92-1	Metals	1.5E+01	1.5E+01	EPA action level	1.5E+01	EPA action level		1.1E+01	8.1E+00	1.1E+01	8.1E+00
71	magnesium	7439-95-4	Metals										
72	manganese (diet)	7439-96-5	Metals										
73	manganese (non-diet)	7439-96-5	Metals		4.3E+02	noncancer	4.3E+02	RSL noncancer					
74	mercury (elemental)	7439-97-6	Metals	2.0E+00	6.3E-01	noncancer	6.3E-01	RSL noncancer		7.7E-01	9.4E-01	1.2E-02	2.5E-02
75	methoxychlor	72-43-5	Pesticides	4.0E+01	3.7E+01	noncancer	3.7E+01	RSL noncancer		3.0E-02	3.0E-02		
76	methyl ethyl ketone (butanone, 2-)	78-93-3	VOCs		5.6E+03	noncancer	5.6E+03	RSL noncancer					

	A	B	C	D	E	F	G	H	I	J	K	L	M
1				**Groundwater to Protect Drinking Water***						**Groundwater to Protect Surface Water - Aquatic Life***			
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER**	**CAS #**	**Chemical Data Group**	**MCL** (µg/L)	**Tap Water RSL** (µg/L)	Tap Water RSL Key	**Lowest of Groundwater to Protect Drinking Water Values (columns D-E) (µg/L)**	**Rationale**		**Aquatic Life Fresh/Chronic** CWA §304 (EPA AWQC) (µg/L)	**Aquatic Life Marine/Chronic** CWA §304 (EPA AWQC) (µg/L)	**Aquatic Life Fresh/Chronic** 173-201A WAC (WA State WQS) (µg/L)	**Aquatic Life Marine/Chronic** 173-201A WAC (WA State WQS) (µg/L)
77	methyl naphthalene; 2-	91-57-6	PAHs		3.6E+01	noncancer	3.6E+01	RSL noncancer					
78	methylene chloride	75-09-2	VOCs	5.0E+00	1.1E+01	cancer	5.0E+00	MCL					
79	methylphenol, 2- (cresol, o-)	95-48-7	Phenols		9.3E+02	noncancer	9.3E+02	RSL noncancer					
80	methylphenol, 4- (cresol, p-)	106-44-5	Phenols		1.9E+03	noncancer	1.9E+03	RSL noncancer					
81	naphthalene	91-20-3	PAHs		1.2E-01	cancer	1.2E-01	RSL cancer					
82	nickel (soluble salts) (see notes re: hardness)	7440-02-0	Metals		3.9E+02	noncancer	3.9E+02	RSL noncancer		1.7E+02	8.2E+00	5.1E+02	8.2E+00
83	nitrosodiphenylamine, N-	86-30-6	SVOCs		1.2E+01	cancer	1.2E+01	RSL cancer					
84	pentachlorophenol	87-86-5	SVOCs	1.0E+00	4.1E-02	cancer	4.1E-02	RSL cancer		1.5E+01	7.9E+00		7.9E+00
85	pH		pH							6.5-9	6.5-8.5		
86	phenanthrene	85-01-8	PAHs										
87	phenol	108-95-2	Phenols		5.8E+03	noncancer	5.8E+03	RSL noncancer					
88	phenylenediamine, 1,4- (phenylenediamine, p-)	106-50-3	SVOCs		2.0E+01	noncancer	2.0E+01	RSL noncancer					
89	polychlorinated biphenyls; total PCBs	1336-36-3	PCBs	5.0E-01	4.4E-02	cancer	4.4E-02	RSL cancer		1.4E-02	3.0E-02	1.4E-02	3.0E-02
90	potassium	7440-09 7	Metals										
91	propanol, 2- (isopropanol)	67-63-0	VOCs		4.1E+02	cancer	4.1E+02	RSL cancer					
92	pyrene	129-00-0	PAHs		1.2E+02	noncancer	1.2E+02	RSL noncancer					
93	selenium and compounds	7782-49-2	Metals	5.0E+01	1.0E+02	noncancer	5.0E+01	MCL			7.1E+01	5.0E+00	7.1E+01
94	silver	7440-22-4	Metals		9.4E+01	noncancer	9.4E+01	RSL noncancer					
95	sodium	82115-62-6	Metals										
96	tetrachloroethylene	127-18-4	VOCs	5.0E+00	1.1E+01	cancer	5.0E+00	MCL					
97	tin	7440-31-5	Metals		1.2E+04	noncancer	1.2E+04	RSL noncancer					
98	toluene	108-88-3	VOCs	1.0E+03	1.1E+03	noncancer	1.0E+03	MCL					
99	total petroleum hydrocarbons (aliphatic high)	E1790670	TPH		6.0E+04	noncancer	6.0E+04	RSL noncancer					
100	total petroleum hydrocarbons (aliphatic low)	E1790666	TPH		1.3E+03	noncancer	1.3E+03	RSL noncancer					
101	total petroleum hydrocarbons (aliphatic medium)	E1790668	TPH		1.0E+02	noncancer	1.0E+02	RSL noncancer					
102	total petroleum hydrocarbons (aromatic high)	E1790676	TPH		8.0E+02	noncancer	8.0E+02	RSL noncancer					
103	total petroleum hydrocarbons (aromatic low)	E1790672	TPH		3.3E+01	noncancer	3.3E+01	RSL noncancer					
104	total petroleum hydrocarbons (aromatic medium)	E1790674	TPH		5.5E+00	noncancer	5.5E+00	RSL noncancer					
105	trichlorobenzene, 1,2,4-	120-82-1	VOCs	7.0E+01	1.2E+00	cancer	1.2E+00	RSL cancer					
106	trichloroethylene (see notes)	79-01-6	VOCs	5.0E+00	4.9E-01	cancer	4.9E-01	RSL cancer					
107	trichlorophenol, 2,4,5-	95-95-4	Phenols		1.2E+03	noncancer	1.2E+03	RSL noncancer					
108	trimethylbenzene; 1,2,4-	95-63-6	VOCs		5.6E+01	noncancer	5.6E+01	RSL noncancer					
109	trimethylbenzene; 1,3,5-	108-67-8	VOCs		6.0E+01	noncancer	6.0E+01	RSL noncancer					
110	vanadium and compounds	7440-62-2	Metals		8.6E+01	noncancer	8.6E+01	RSL noncancer					
111	vanillin (4-hydroxy-3-methoxybenzaldehyde)	121-33-5	SVOCs										
112	xylene; m-	108-38-3	VOCs		1.9E+02	noncancer	1.9E+02	RSL noncancer					
113	xylene; o-	95-47-6	VOCs		1.9E+02	noncancer	1.9E+02	RSL noncancer					

	A	B	C	D	E	F	G	H	I	J	K	L	M
1				**Groundwater to Protect Drinking Water***						**Groundwater to Protect Surface Water - Aquatic Life***			
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER**	**CAS #**	**Chemical Data Group**	**MCL** (µg/L)	**Tap Water RSL** (µg/L)	Tap Water RSL Key	**Lowest of Groundwater to Protect Drinking Water Values (columns D-E) (µg/L)**	**Rationale**		**Aquatic Life Fresh/Chronic** CWA §304 (EPA AWQC) (µg/L)	**Aquatic Life Marine/Chronic** CWA §304 (EPA AWQC) (µg/L)	**Aquatic Life Fresh/Chronic** 173-201A WAC (WA State WQS) (µg/L)	**Aquatic Life Marine/Chronic** 173-201A WAC (WA State WQS) (µg/L)
114	xylene; p-	106-42-3	VOCs		1.9E+02	noncancer	1.9E+02	RSL noncancer					
115	xylenes (total)	1330-20-7	VOCs	1.0E+04	1.9E+02	noncancer	1.9E+02	RSL noncancer					
116	zinc and compounds (see notes re: hardness)	7440-66-6	Metals		6.0E+03	noncancer	6.0E+03	RSL noncancer		3.8E+02	8.1E+01	3.4E+02	8.1E+01
117													
118	* - Groundwater to Protect Drinking Water values apply throughout the Facility and plume. Groundwater to Protect Surface Water and Sediment values apply at the monitoring well network located along the LDW and Slip 6.												
119	Blank cells indicate a value is not available												
120	ug/L - microgram per liter												

	A	B	C	N	O	P	Q	R	S	T	U
1				**Groundwater to Protect Surface Water - Human Health Consumption of Organism Only***		**Groundwater to Protect Surface Water - Tribal Fish and Shellfish Consumption***		**Groundwater to Protect Sediment***		**Groundwater to Protect Surface Water and Sediment***	
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER**	**CAS #**	**Chemical Data Group**	**Human Health (Organism Only)** CWA §304 (EPA AWQC) (µg/L)	**Human Health (Organism Only)** 173-201A WAC (WA State WQS) (µg/L)	**Lowest of Tribal Fish Consumption Values** (from spreadsheet 1b) (µg/L)	**Rationale**	**LDW PCUL GW-3** Groundwater to Protect Sediment (µg/L)	**LDW Background** (µg/L) (see notes)	**Lowest of Surface Water Values (columns J-R or column S if higher) (µg/L)**	**Rationale**
3	acenaphthene	83-32-9	PAHs	9.0E+01	1.1E+02	1.1E+02	Tribal consumption-noncancer	5.3E+00		5.3E+00	LDW PCUL
4	acenaphthylene	208-96-8	PAHs								
5	acetone	67-64-1	VOCs			1.1E+05	Tribal consumption-noncancer			1.1E+05	Tribal consumption-noncancer
6	aldrin (see notes re: aldrin and dieldrin)	309-00-2	Pesticides	7.7E-07	5.8E-06	1.3E-05	Tribal consumption-cancer	1.1E-04		7.7E-07	EPA HH AWQC
7	aluminum	7429-90-5	Metals								
8	anthracene	120-12-7	PAHs	4.0E+02	4.6E+03	2.0E+02	Tribal consumption-noncancer	2.1E+00		2.1E+00	LDW PCUL
9	antimony (metallic)	7440-36-0	Metals	6.4E+02	1.8E+02	3.8E+00	Tribal consumption-noncancer			3.8E+00	Tribal consumption-noncancer
10	aroclor 1254	11097-69-1	PCBs			4.5E-06	Tribal consumption-cancer			4.5E-06	Tribal consumption-cancer
11	aroclor 1260	11096-82-5	PCBs			4.5E-06	Tribal consumption-cancer			4.5E-06	Tribal consumption-cancer
12	arsenic, inorganic	7440-38-2	Metals	1.4E-01		4.4E-03	Tribal consumption-cancer	2.2E+02	8.0E+00	8.0E+00	LDW Background
13	barium and compounds	7440-39-3	Metals			7.7E+02	Tribal consumption-noncancer	9.3E+05		7.7E+02	Tribal consumption-noncancer
14	benzene	71-43-2	VOCs	1.6E+01	1.6E+00	1.7E+00	Tribal consumption-cancer			1.6E+00	WA State HH WQS
15	benzo[a]anthracene	56-55-3	cPAHs	1.3E-03	2.1E-02	7.8E-04	Tribal consumption-cancer	1.9E-01		7.8E-04	Tribal consumption-cancer
16	benzo[a]pyrene	50-32-8	cPAHs	1.3E-04	2.1E-03	4.6E-05	Tribal consumption-cancer	8.7E-02		4.6E-05	Tribal consumption-cancer
17	benzo[b]fluoranthene	205-99-2	cPAHs	1.3E-03	2.1E-02	3.7E-04	Tribal consumption-cancer			3.7E-04	Tribal consumption-cancer
18	benzo[g,h,i]perylene	191-24-2	PAHs								
19	benzo[k]fluoranthene	207-08-9	cPAHs	1.3E-02	2.1E-01	3.8E-03	Tribal consumption-cancer			3.8E-03	Tribal consumption-cancer
20	benzoic acid	65-85-0	SVOCs			4.9E+05	Tribal consumption-noncancer	5.9E+02		5.9E+02	LDW PCUL
21	benzyl alcohol	100-51-6	SVOCs			1.2E+05	Tribal consumption-noncancer			1.2E+05	Tribal consumption-noncancer
22	beryllium	7440-41-7	Metals			1.2E+01	Tribal consumption-noncancer	4.9E+00		4.9E+00	LDW PCUL
23	bis(2-ethylhexyl)-phthalate	117-81-7	Phthalates	3.7E-01	2.5E-01	1.0E+00	Tribal consumption-cancer	6.2E-01		2.5E-01	WA State HH WQS
24	bromoform	75-25-2	VOCs	1.2E+02	2.7E+01	7.2E+00	Tribal consumption-cancer			7.2E+00	Tribal consumption-cancer
25	butyl benzyl phthalate	85-68-7	Phthalates	1.0E-01	5.8E-01	3.4E-01	Tribal consumption-cancer	2.4E-01		1.0E-01	EPA HH AWQC
26	butylbenzene; sec-	135-98-8	VOCs								
27	cadmium (food/diet)	7440-43-9	Metals			4.2E-01	Tribal consumption-noncancer	1.2E+00		4.2E-01	Tribal consumption-noncancer
28	cadmium (water) (see notes re: hardness)	7440-43-9	Metals			2.1E-01	Tribal consumption-noncancer			2.1E-01	Tribal consumption-noncancer
29	calcium	203863-17-6	Metals								
30	carbazole	86-74-8	PAHs								
31	carbon disulfide	75-15-0	VOCs			3.9E+03	Tribal consumption-noncancer			3.9E+03	Tribal consumption-noncancer
32	chlordane (technical)	12789-03-6	Pesticides	3.2E-04						3.2E-04	EPA HH AWQC
33	chlordane	57-74-9	Pesticides	3.2E-04	9.3E-05					9.3E-05	WA State HH WQS
34	chromium (III), insoluble salts (see notes re: hardness)	16065-83-1	Metals					8.5E+01		8.5E+01	LDW PCUL
35	chromium (total)	7440-47-3	Metals								
36	chromium (VI)	18540-29-9	Metals			4.8E-01	Tribal consumption-cancer	5.0E+04		4.8E-01	Tribal consumption-cancer
37	chrysene	218-01-9	cPAHs	1.3E-01	2.1E+00	7.8E-02	Tribal consumption-cancer	1.9E-01		7.8E-02	Tribal consumption-cancer
38	cobalt	7440-48-4	Metals								
39	copper (see notes re: hardness)	7440-50-8	Metals			4.3E+02	Tribal consumption-noncancer	1.4E+01	8.0E+00	8.0E+00	LDW Background

	A	B	C	N	O	P	Q	R	S	T	U
1				**Groundwater to Protect Surface Water - Human Health Consumption of Organism Only***		**Groundwater to Protect Surface Water - Tribal Fish and Shellfish Consumption***		**Groundwater to Protect Sediment***		**Groundwater to Protect Surface Water and Sediment***	
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER**	**CAS #**	**Chemical Data Group**	**Human Health (Organism Only)** CWA §304 (EPA AWQC) (µg/L)	**Human Health (Organism Only)** 173-201A WAC (WA State WQS) (µg/L)	**Lowest of Tribal Fish Consumption Values** (from spreadsheet 1b) (µg/L)	**Rationale**	**LDW PCUL GW-3** Groundwater to Protect Sediment (µg/L)	**LDW Background** (µg/L) (see notes)	**Lowest of Surface Water Values (columns J-R or column S if higher) (µg/L)**	**Rationale**
40	DDD, 4,4'-	72-54-8	Pesticides	1.2E-04	3.6E-05	3.8E-04	Tribal consumption-cancer	7.9E+00		3.6E-05	WA State HH WQS
41	DDE, 4,4'-	72-55-9	Pesticides	1.8E-05	5.1E-05	4.6E-04	Tribal consumption-cancer	3.8E+00		1.8E-05	EPA HH AWQC
42	DDT, 4,4'-	50-29-3	Pesticides	3.0E-05	2.5E-05	1.3E-04	Tribal consumption-cancer	7.8E-06		7.8E-06	LDW PCUL
43	dibenz[a,h]anthracene	53-70-3	cPAHs	1.3E-04	2.1E-03	1.9E-05	Tribal consumption-cancer	6.8E-03		1.9E-05	Tribal consumption-cancer
44	dibenzofuran	132-64-9	PAHs								
45	dichlorobenzene; 1,2-	95-50-1	VOCs	3.0E+03	2.5E+03	4.3E+02	Tribal consumption-noncancer	4.6E+00		4.6E+00	LDW PCUL
46	dichlorobenzene; 1,4-	106-46-7	VOCs	9.0E+02	5.8E+02	1.4E+00	Tribal consumption-cancer	8.9E+00		1.4E+00	Tribal consumption-cancer
47	dichloroethylene; 1,2-,cis	156-59-2	VOCs			1.3E+02	Tribal consumption-noncancer			1.3E+02	Tribal consumption-noncancer
48	dieldrin (see notes re: aldrin and dieldrin)	60-57-1	Pesticides	1.2E-06	6.1E-06	8.1E-05	Tribal consumption-cancer	2.1E-04		1.2E-06	EPA HH AWQC
49	diethyl phthalate	84-66-2	Phthalates	6.0E+02	5.0E+03	1.8E+04	Tribal consumption-noncancer	9.3E+01		9.3E+01	LDW PCUL
50	dimethylphenol; 2,4-	105-67-9	Phenols	3.0E+03	9.7E+01	6.5E+02	Tribal consumption-noncancer	6.3E+00		6.3E+00	LDW PCUL
51	dimethyl phthalate	131-11-3	Phthalates	2.0E+03	1.3E+05					2.0E+03	EPA HH AWQC
52	di-n-butyl-phthalate (dibutyl phthalate)	84-74-2	Phthalates	3.0E+01	5.1E+02	4.6E+01	Tribal consumption-noncancer	4.6E+01		3.0E+01	EPA HH AWQC
53	di-n-octyl phthalate	117-84-0	Phthalates			6.1E+01	Tribal consumption-noncancer	3.9E-03		3.9E-03	LDW PCUL
54	endosulfan	115-29-7	Pesticides			1.4E+01	Tribal consumption-noncancer			8.7E-03	WA State Marine WQS
55	endosulfan I (alpha)	959-98-8	Pesticides	3.0E+01				3.0E+04		8.7E-03	EPA Marine AWQC
56	endosulfan II (beta)	33213-65-9	Pesticides	4.0E+01				3.0E+04		8.7E-03	EPA Marine AWQC
57	endosulfan sulfate	1031-07-8	Pesticides	4.0E+01	1.0E+01					1.0E+01	WA State HH WQS
58	endrin	72-20-8	Pesticides	3.0E-02	3.5E-02	1.7E-01	Tribal consumption-noncancer	2.9E+02		2.3E-03	EPA Marine AWQC
59	endrin aldehyde	7421-93-4	Pesticides	1.0E+00	3.5E-02					3.5E-02	WA State HH WQS
60	endrin ketone	53494-70-5	Pesticides								
61	ethylbenzene	100-41-4	VOCs	1.3E+02	2.7E+02	1.4E+00	Tribal consumption-cancer			1.4E+00	Tribal consumption-cancer
62	fluoranthene	206-44-0	PAHs	2.0E+01	1.6E+01	1.1E+01	Tribal consumption-noncancer	1.8E+00		1.8E+00	LDW PCUL
63	fluorene	86-73-7	PAHs	7.0E+01	6.1E+02	4.5E+01	Tribal consumption-noncancer	3.7E+00		3.7E+00	LDW PCUL
64	formaldehyde	50-00-0	VOCs			1.1E+01	Tribal consumption-cancer			1.1E+01	Tribal consumption-cancer
65	hexachlorobenzene	118-74-1	Pesticides	7.9E-05	5.2E-05	2.0E-04	Tribal consumption-cancer	1.4E-02		5.2E-05	WA State HH WQS
66	hexachlorocyclohexane, delta- (delta-BHC)	319-86-8	Pesticides								
67	indeno[1,2,3-cd]pyrene	193-39-5	cPAHs	1.3E-03	2.1E-02	1.6E-04	Tribal consumption-cancer	9.1E-03		1.6E-04	Tribal consumption-cancer
68	iron	7439-89-6	Metals							1.0E+03	EPA FW AWQC
69	isopropyltoluene, 4- (cymene, p-)	99-87-6	VOCs								
70	lead (see notes re: hardness)	7439-92-1	Metals					1.9E+01		8.1E+00	EPA Marine AWQC
71	magnesium	7439-95-4	Metals								
72	manganese (diet)	7439-96-5	Metals	1.0E+02					2.0E+03	2.0E+03	LDW Background
73	manganese (non-diet)	7439-96-5	Metals						2.0E+03		
74	mercury (elemental)	7439-97-6	Metals					2.0E+00		1.2E-02	WA State FW WQS
75	methoxychlor	72-43-5	Pesticides	2.0E-02		1.9E+00	Tribal consumption-noncancer	6.6E+02		2.0E-02	EPA HH AWQC
76	methyl ethyl ketone (butanone, 2-)	78-93-3	VOCs			7.3E+04	Tribal consumption-noncancer			7.3E+04	Tribal consumption-noncancer

	A	B	C	N	O	P	Q	R	S	T	U
1				**Groundwater to Protect Surface Water - Human Health Consumption of Organism Only***		**Groundwater to Protect Surface Water - Tribal Fish and Shellfish Consumption***		**Groundwater to Protect Sediment***		**Groundwater to Protect Surface Water and Sediment***	
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER**	**CAS #**	**Chemical Data Group**	**Human Health (Organism Only)** CWA §304 (EPA AWQC) (µg/L)	**Human Health (Organism Only)** 173-201A WAC (WA State WQS) (µg/L)	**Lowest of Tribal Fish Consumption Values** (from spreadsheet 1b) (µg/L)	**Rationale**	**LDW PCUL GW-3** Groundwater to Protect Sediment (µg/L)	**LDW Background** (µg/L) (see notes)	**Lowest of Surface Water Values (columns J-R or column S if higher) (µg/L)**	**Rationale**
77	methyl naphthalene; 2-	91-57-6	PAHs								
78	methylene chloride	75-09-2	VOCs	1.0E+03	2.5E+02	1.9E+02	Tribal consumption-cancer			1.9E+02	Tribal consumption-cancer
79	methylphenol, 2- (cresol, o-)	95-48-7	Phenols			3.0E+03	Tribal consumption-noncancer	2.7E+01		2.7E+01	LDW PCUL
80	methylphenol, 4- (cresol, p-)	106-44-5	Phenols			6.6E+03	Tribal consumption-noncancer			6.6E+03	Tribal consumption-noncancer
81	naphthalene	91-20-3	PAHs			9.1E-02	Tribal consumption-cancer	9.0E+01		9.1E-02	Tribal consumption-cancer
82	nickel (soluble salts) (see notes re: hardness)	7440-02-0	Metals	4.6E+03	1.9E+02	9.9E+01	Tribal consumption-noncancer	2.6E+03		8.2E+00	EPA Marine AWQC
83	nitrosodiphenylamine, N-	86-30-6	SVOCs		6.9E-01	3.2E+00	Tribal consumption-cancer	1.1E+00		6.9E-01	WA State HH WQS
84	pentachlorophenol	87-86-5	SVOCs	4.0E-02	1.0E-01	2.8E-03	Tribal consumption-cancer	8.8E-01		2.8E-03	Tribal consumption-cancer
85	pH		pH								
86	phenanthrene	85-01-8	PAHs								
87	phenol	108-95-2	Phenols	3.0E+05	2.0E+05	4.0E+04	Tribal consumption-noncancer	3.7E+02		3.7E+02	LDW PCUL
88	phenylenediamine, 1,4- (phenylenediamine, p-)	106-50-3	SVOCs								
89	polychlorinated biphenyls; total PCBs	1336-36-3	PCBs	6.4E-05	1.7E-04			2.2E-02		6.4E-05	EPA HH AWQC
90	potassium	7440-09 7	Metals								
91	propanol, 2- (isopropanol)	67-63-0	VOCs								
92	pyrene	129-00-0	PAHs	3.0E+01	4.6E+02	9.8E+00	Tribal consumption-noncancer	2.0E+00		2.0E+00	LDW PCUL
93	selenium and compounds	7782-49-2	Metals	4.2E+03	4.8E+02	1.5E+01	Tribal consumption-noncancer	4.3E+05		5.0E+00	WA State FW WQS
94	silver	7440-22-4	Metals			2.2E+01	Tribal consumption-noncancer	5.5E+01		2.2E+01	Tribal consumption-noncancer
95	sodium	82115-62-6	Metals								
96	tetrachloroethylene	127-18-4	VOCs	2.9E+01	7.1E+00	4.4E+00	Tribal consumption-cancer			4.4E+00	Tribal consumption-cancer
97	tin	7440-31-5	Metals								
98	toluene	108-88-3	VOCs	5.2E+02	4.1E+02	1.3E+03	Tribal consumption-noncancer			4.1E+02	WA State HH WQS
99	total petroleum hydrocarbons (aliphatic high)	E1790670	TPH								
100	total petroleum hydrocarbons (aliphatic low)	E1790666	TPH								
101	total petroleum hydrocarbons (aliphatic medium)	E1790668	TPH								
102	total petroleum hydrocarbons (aromatic high)	E1790676	TPH								
103	total petroleum hydrocarbons (aromatic low)	E1790672	TPH								
104	total petroleum hydrocarbons (aromatic medium)	E1790674	TPH								
105	trichlorobenzene, 1,2,4-	120-82-1	VOCs	7.6E-02	1.4E-01	1.1E-01	Tribal consumption-cancer	9.6E-01		7.6E-02	EPA HH AWQC
106	trichloroethylene (see notes)	79-01-6	VOCs	7.0E+00	8.6E-01	1.2E+00	Tribal consumption-cancer			8.6E-01	WA State HH WQS
107	trichlorophenol, 2,4,5-	95-95-4	Phenols	6.0E+02		6.6E+02	Tribal consumption-noncancer	6.7E+04		6.0E+02	EPA HH AWQC
108	trimethylbenzene; 1,2,4-	95-63-6	VOCs								
109	trimethylbenzene; 1,3,5-	108-67-8	VOCs			4.5E+01	Tribal consumption-noncancer			4.5E+01	Tribal consumption-noncancer
110	vanadium and compounds	7440-62-2	Metals								
111	vanillin (4-hydroxy-3-methoxybenzaldehyde)	121-33-5	SVOCs								
112	xylene; m-	108-38-3	VOCs			1.3E+03	Tribal consumption-noncancer			1.3E+03	Tribal consumption-noncancer
113	xylene; o-	95-47-6	VOCs			1.6E+03	Tribal consumption-noncancer			1.6E+03	Tribal consumption-noncancer

	A	B	C	N	O	P	Q	R	S	T	U
1				**Groundwater to Protect Surface Water - Human Health Consumption of Organism Only***		**Groundwater to Protect Surface Water - Tribal Fish and Shellfish Consumption***		**Groundwater to Protect Sediment***		**Groundwater to Protect Surface Water and Sediment***	
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER**	**CAS #**	**Chemical Data Group**	**Human Health (Organism Only)** CWA §304 (EPA AWQC) (µg/L)	**Human Health (Organism Only)** 173-201A WAC (WA State WQS) (µg/L)	**Lowest of Tribal Fish Consumption Values** (from spreadsheet 1b) (µg/L)	**Rationale**	**LDW PCUL GW-3** Groundwater to Protect Sediment (µg/L)	**LDW Background** (µg/L) (see notes)	**Lowest of Surface Water Values (columns J-R or column S if higher) (µg/L)**	**Rationale**
114	xylene; p-	106-42-3	VOCs			1.6E+03	Tribal consumption-noncancer			1.6E+03	Tribal consumption-noncancer
115	xylenes (total)	1330-20-7	VOCs								
116	zinc and compounds (see notes re: hardness)	7440-66-6	Metals	2.6E+04	2.9E+03	5.6E+01	Tribal consumption-noncancer	7.7E+02		5.6E+01	Tribal consumption-noncancer
117											
118	* - Groundwater to Protect Drinking Water values apply throughout the Facility and										
119	Blank cells indicate a value is not available										
120	ug/L - microgram per liter										

	A	B	C	D	E	F	G	H	I	J
1							**Groundwater to Protect Surface Water - Tribal Fish and Shellfish Consumption**			
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER TO PROTECT SURFACE WATER: TRIBAL FISH AND SHELLFISH CONSUMPTION**	**CAS #**	**Chemical Data Group**	Bioconcentration Factor (BCF) fish fresh weight (L/kg FW) (see notes)	Oral Cancer Slope Factor (SFO) $(mg/kg\text{-}day)^{-1}$ (see notes)	Oral Reference Dose (RfD_o) (mg/kg-day) (see notes)	**EPA Tribal fish consumption, cancer** (µg/L)	**EPA Tribal fish consumption child, noncancer** (µg/L)	**Lowest of Tribal Fish and Shellfish Consumption values (columns G-H) (µg/L)**	**Rationale**
3	acenaphthene	83-32-9	PAHs	2.01E+02		6.0E-02		1.1E+02	1.1E+02	Tribal consumption-noncancer
4	acenaphthylene	208-96-8	PAHs	not in HHRAP						
5	acetone	67-64-1	VOCs	3.16E+00		9.0E-01		1.1E+05	1.1E+05	Tribal consumption-noncancer
6	aldrin (see notes re: aldrin and dieldrin)	309-00-2	Pesticides	3.43E+03	1.7E+01	3.0E-05	1.3E-05	3.4E-03	1.3E-05	Tribal consumption-cancer
7	aluminum	7429-90-5	Metals	not in HHRAP		1.0E+00				
8	anthracene	120-12-7	PAHs	5.82E+02		3.0E-01		2.0E+02	2.0E+02	Tribal consumption-noncancer
9	antimony (metallic)	7440-36-0	Metals	4.00E+01		4.0E-04		3.8E+00	3.8E+00	Tribal consumption-noncancer
10	aroclor 1254	11097-69-1	PCBs	8.41E+04	2.0E+00	2.0E-05	4.5E-06	9.1E-05	4.5E-06	Tribal consumption-cancer
11	aroclor 1260	11096-82-5	PCBs	8.41E+04	2.0E+00		4.5E-06		4.5E-06	Tribal consumption-cancer
12	arsenic, inorganic	7440-38-2	Metals	1.14E+02	1.5E+00	3.0E-04	4.4E-03	1.0E+00	4.4E-03	Tribal consumption-cancer
13	barium and compounds	7440-39-3	Metals	1.00E+02		2.0E-01		7.7E+02	7.7E+02	Tribal consumption-noncancer
14	benzene	71-43-2	VOCs	8.26E+00	5.5E-02	4.0E-03	1.7E+00	1.9E+02	1.7E+00	Tribal consumption-cancer
15	benzo[a]anthracene	56-55-3	cPAHs	4.89E+03	1.0E-01		7.8E-04		7.8E-04	Tribal consumption-cancer
16	benzo[a]pyrene	50-32-8	cPAHs	8.32E+03	1.0E+00	3.0E-04	4.6E-05	1.4E-02	4.6E-05	Tribal consumption-cancer
17	benzo[b]fluoranthene	205-99-2	cPAHs	1.04E+04	1.0E-01		3.7E-04		3.7E-04	Tribal consumption-cancer
18	benzo[g,h,i]perylene	191-24-2	PAHs	not in HHRAP						
19	benzo[k]fluoranthene	207-08-9	cPAHs	9.93E+03	1.0E-02		3.8E-03		3.8E-03	Tribal consumption-cancer
20	benzoic acid	65-85-0	SVOCs	3.16E+00		4.0E+00		4.9E+05	4.9E+05	Tribal consumption-noncancer
21	benzyl alcohol	100-51-6	SVOCs	3.14E-01		1.0E-01		1.2E+05	1.2E+05	Tribal consumption-noncancer
22	beryllium	7440-41-7	Metals	6.20E+01		2.0E-03		1.2E+01	1.2E+01	Tribal consumption-noncancer
23	bis(2-ethylhexyl)-phthalate	117-81-7	Phthalates	5.33E+01	1.4E-02	2.0E-02	1.0E+00	1.4E+02	1.0E+00	Tribal consumption-cancer
24	bromoform	75-25-2	VOCs	1.33E+01	7.9E-03	2.0E-02	7.2E+00	5.8E+02	7.2E+00	Tribal consumption-cancer
25	butyl benzyl phthalate	85-68-7	Phthalates	1.18E+03	1.9E-03	2.0E-01	3.4E-01	6.5E+01	3.4E-01	Tribal consumption-cancer
26	butylbenzene; sec-	135-98-8	VOCs	not in HHRAP		1.0E-01				
27	cadmium (food/diet)	7440-43-9	Metals	9.07E+02		1.0E-03		4.2E-01	4.2E-01	Tribal consumption-noncancer
28	cadmium (water) (see notes re: hardness)	7440-43-9	Metals	9.07E+02		5.0E-04		2.1E-01	2.1E-01	Tribal consumption-noncancer
29	calcium	203863-17-6	Metals	not in HHRAP						
30	carbazole	86-74-8	PAHs	not in HHRAP						
31	carbon disulfide	75-15-0	VOCs	9.86E+00		1.0E-01		3.9E+03	3.9E+03	Tribal consumption-noncancer
32	chlordane (technical)	12789-03-6	Pesticides	not in HHRAP	3.5E-01	5.0E-04				
33	chlordane	57-74-9	Pesticides	3.43E+03						
34	chromium (III), insoluble salts (see notes re: hardness)	16065-83-1	Metals	not in HHRAP		1.5E+00				
35	chromium (total)	7440-47-3	Metals	1.90E+01						
36	chromium (VI)	18540-29-9	Metals	3.16E+00	5.0E-01	3.0E-03	4.8E-01	3.7E+02	4.8E-01	Tribal consumption-cancer
37	chrysene	218-01-9	cPAHs	4.89E+03	1.0E-03		7.8E-02		7.8E-02	Tribal consumption-cancer
38	cobalt	7440-48-4	Metals	not in HHRAP		3.0E-04				
39	copper (see notes re: hardness)	7440-50-8	Metals	3.60E+01		4.0E-02		4.3E+02	4.3E+02	Tribal consumption-noncancer
40	DDD, 4,4'-	72-54-8	Pesticides	8.32E+03	2.4E-01	3.0E-05	3.8E-04	1.4E-03	3.8E-04	Tribal consumption-cancer
41	DDE, 4,4'-	72-55-9	Pesticides	4.89E+03	3.4E-01	3.0E-04	4.6E-04	2.4E-02	4.6E-04	Tribal consumption-cancer

	A	B	C	D	E	F	G	H	I	J
1							**Groundwater to Protect Surface Water - Tribal Fish and Shellfish Consumption**			
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER TO PROTECT SURFACE WATER: TRIBAL FISH AND SHELLFISH CONSUMPTION**	**CAS #**	**Chemical Data Group**	Bioconcentration Factor (BCF) fish fresh weight (L/kg FW) (see notes)	Oral Cancer Slope Factor (SFO) $(mg/kg\text{-}day)^{-1}$ (see notes)	Oral Reference Dose (RfD_o) (mg/kg-day) (see notes)	**EPA Tribal fish consumption, cancer** (µg/L)	**EPA Tribal fish consumption child, noncancer** (µg/L)	**Lowest of Tribal Fish and Shellfish Consumption values (columns G-H) (µg/L)**	**Rationale**
42	DDT, 4,4'-	50-29-3	Pesticides	1.69E+04	3.4E-01	5.0E-04	1.3E-04	1.1E-02	1.3E-04	Tribal consumption-cancer
43	dibenz[a,h]anthracene	53-70-3	cPAHs	2.02E+04	1.0E+00		1.9E-05		1.9E-05	Tribal consumption-cancer
44	dibenzofuran	132-64-9	PAHs	not in HHRAP		1.0E-03				
45	dichlorobenzene; 1,2-	95-50-1	VOCs	7.99E+01		9.0E-02		4.3E+02	4.3E+02	Tribal consumption-noncancer
46	dichlorobenzene; 1,4-	106-46-7	VOCs	9.89E+01	5.4E-03	7.0E-02	1.4E+00	2.7E+02	1.4E+00	Tribal consumption-cancer
47	dichloroethylene; 1,2-,cis	156-59-2	VOCs	5.79E+00		2.0E-03		1.3E+02	1.3E+02	Tribal consumption-noncancer
48	dieldrin (see notes re: aldrin and dieldrin)	60-57-1	Pesticides	5.82E+02	1.6E+01	5.0E-05	8.1E-05	3.3E-02	8.1E-05	Tribal consumption-cancer
49	diethyl phthalate	84-66-2	Phthalates	1.68E+01		8.0E-01		1.8E+04	1.8E+04	Tribal consumption-noncancer
50	dimethylphenol; 2,4-	105-67-9	Phenols	1.18E+01		2.0E-02		6.5E+02	6.5E+02	Tribal consumption-noncancer
51	dimethyl phthalate	131-11-3	Phthalates	3.17E+00						
52	di-n-butyl-phthalate (dibutyl phthalate)	84-74-2	Phthalates	8.30E+02		1.0E-01		4.6E+01	4.6E+01	Tribal consumption-noncancer
53	di-n-octyl phthalate	117-84-0	Phthalates	6.35E+01		1.0E-02		6.1E+01	6.1E+01	Tribal consumption-noncancer
54	endosulfan	115-29-7	Pesticides	1.68E+02		6.0E-03		1.4E+01	1.4E+01	Tribal consumption-noncancer
55	endosulfan I (alpha)	959-98-8	Pesticides	not in HHRAP						
56	endosulfan II (beta)	33213-65-9	Pesticides	not in HHRAP						
57	endosulfan sulfate	1031-07-8	Pesticides	not in HHRAP		6.0E-03				
58	endrin	72-20-8	Pesticides	6.95E+02		3.0E-04		1.7E-01	1.7E-01	Tribal consumption-noncancer
59	endrin aldehyde	7421-93-4	Pesticides	not in HHRAP						
60	endrin ketone	53494-70-5	Pesticides	not in HHRAP						
61	ethylbenzene	100-41-4	VOCs	4.86E+01	1.1E-02	1.0E-01	1.4E+00	7.9E+02	1.4E+00	Tribal consumption-cancer
62	fluoranthene	206-44-0	PAHs	1.41E+03		4.0E-02		1.1E+01	1.1E+01	Tribal consumption-noncancer
63	fluorene	86-73-7	PAHs	3.42E+02		4.0E-02		4.5E+01	4.5E+01	Tribal consumption-noncancer
64	formaldehyde	50-00-0	VOCs	3.16E+00	2.1E-02	2.0E-01	1.1E+01	2.4E+04	1.1E+01	Tribal consumption-cancer
65	hexachlorobenzene	118-74-1	Pesticides	2.40E+03	1.6E+00	8.0E-04	2.0E-04	1.3E-01	2.0E-04	Tribal consumption-cancer
66	hexachlorocyclohexane, delta- (delta-BHC)	319-86-8	Pesticides	not in HHRAP						
67	indeno[1,2,3-cd]pyrene	193-39-5	cPAHs	2.41E+04	1.0E-01		1.6E-04		1.6E-04	Tribal consumption-cancer
68	iron	7439-89-6	Metals	not in HHRAP		7.0E-01				
69	isopropyltoluene, 4- (cymene, p-)	99-87-6	VOCs	not in HHRAP						
70	lead (see notes re: hardness)	7439-92-1	Metals	9.00E-02						
71	magnesium	7439-95-4	Metals	not in HHRAP						
72	manganese (diet)	7439-96-5	Metals	not in HHRAP		1.4E-01				
73	manganese (non-diet)	7439-96-5	Metals	not in HHRAP		2.4E-02				
74	mercury (elemental)	7439-97-6	Metals	not in HHRAP						
75	methoxychlor	72-43-5	Pesticides	9.91E+02		5.0E-03		1.9E+00	1.9E+00	Tribal consumption-noncancer
76	methyl ethyl ketone (butanone, 2-)	78-93-3	VOCs	3.16E+00		6.0E-01		7.3E+04	7.3E+04	Tribal consumption-noncancer
77	methyl naphthalene; 2-	91-57-6	PAHs	not in HHRAP		4.0E-03				
78	methylene chloride	75-09-2	VOCs	2.00E+00	2.0E-03	6.0E-03	1.9E+02	1.2E+03	1.9E+02	Tribal consumption-cancer
79	methylphenol, 2- (cresol, o-)	95-48-7	Phenols	6.33E+00		5.0E-02		3.0E+03	3.0E+03	Tribal consumption-noncancer
80	methylphenol, 4- (cresol, p-)	106-44-5	Phenols	5.79E+00		1.0E-01		6.6E+03	6.6E+03	Tribal consumption-noncancer

	A	B	C	D	E	F	G	H	I	J
1							Groundwater to Protect Surface Water - Tribal Fish and Shellfish Consumption			
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER TO PROTECT SURFACE WATER: TRIBAL FISH AND SHELLFISH CONSUMPTION**	**CAS #**	**Chemical Data Group**	Bioconcentration Factor (BCF) fish fresh weight (L/kg FW) (see notes)	Oral Cancer Slope Factor (SFO) $(mg/kg\text{-}day)^{-1}$ (see notes)	Oral Reference Dose (RfD_o) (mg/kg-day) (see notes)	**EPA Tribal fish consumption, cancer** (µg/L)	**EPA Tribal fish consumption child, noncancer** (µg/L)	**Lowest of Tribal Fish and Shellfish Consumption values (columns G-H) (µg/L)**	**Rationale**
81	naphthalene	91-20-3	PAHs	6.93E+01	1.2E-01	2.0E-02	9.1E-02	1.1E+02	9.1E-02	Tribal consumption-cancer
82	nickel (soluble salts) (see notes re: hardness)	7440-02-0	Metals	7.80E+01		2.0E-02		9.9E+01	9.9E+01	Tribal consumption-noncancer
83	nitrosodiphenylamine, N-	86-30-6	SVOCs	4.86E+01	4.9E-03		3.2E+00		3.2E+00	Tribal consumption-cancer
84	pentachlorophenol	87-86-5	SVOCs	6.71E+02	4.0E-01	5.0E-03	2.8E-03	2.9E+00	2.8E-03	Tribal consumption-cancer
85	pH		pH	not in HHRAP						
86	phenanthrene	85-01-8	PAHs	5.82E+02						
87	phenol	108-95-2	Phenols	2.85E+00		3.0E-01		4.0E+04	4.0E+04	Tribal consumption-noncancer
88	phenylenediamine, 1,4- (phenylenediamine, p-)	106-50-3	SVOCs	not in HHRAP		1.0E-03				
89	polychlorinated biphenyls; total PCBs	1336-36-3	PCBs	not in HHRAP	2.0E+00					
90	potassium	7440-09 7	Metals	not in HHRAP						
91	propanol, 2- (isopropanol)	67-63-0	VOCs	not in HHRAP		2.0E+00				
92	pyrene	129-00-0	PAHs	1.18E+03		3.0E-02		9.8E+00	9.8E+00	Tribal consumption-noncancer
93	selenium and compounds	7782-49-2	Metals	1.29E+02		5.0E-03		1.5E+01	1.5E+01	Tribal consumption-noncancer
94	silver	7440-22-4	Metals	8.77E+01		5.0E-03		2.2E+01	2.2E+01	Tribal consumption-noncancer
95	sodium	82115-62-6	Metals	not in HHRAP						
96	tetrachloroethylene	127-18-4	VOCs	8.28E+01	2.1E-03	6.0E-03	4.4E+00	2.8E+01	4.4E+00	Tribal consumption-cancer
97	tin	7440-31-5	Metals	not in HHRAP		6.0E-01				
98	toluene	108-88-3	VOCs	2.39E+01		8.0E-02		1.3E+03	1.3E+03	Tribal consumption-noncancer
99	total petroleum hydrocarbons (aliphatic high)	E1790670	TPH	not in HHRAP		3.0E+00				
100	total petroleum hydrocarbons (aliphatic low)	E1790666	TPH	not in HHRAP						
101	total petroleum hydrocarbons (aliphatic medium)	E1790668	TPH	not in HHRAP		1.0E-02				
102	total petroleum hydrocarbons (aromatic high)	E1790676	TPH	not in HHRAP		4.0E-02				
103	total petroleum hydrocarbons (aromatic low)	E1790672	TPH	not in HHRAP		4.0E-03				
104	total petroleum hydrocarbons (aromatic medium)	E1790674	TPH	not in HHRAP		4.0E-03				
105	trichlorobenzene, 1,2,4-	120-82-1	VOCs	2.40E+02	2.9E-02	1.0E-02	1.1E-01	1.6E+01	1.1E-01	Tribal consumption-cancer
106	trichloroethylene (see notes)	79-01-6	VOCs	1.41E+01	4.6E-02	5.0E-04	1.2E+00	1.4E+01	1.2E+00	Tribal consumption-cancer
107	trichlorophenol, 2,4,5-	95-95-4	Phenols	5.81E+01		1.0E-01		6.6E+02	6.6E+02	Tribal consumption-noncancer
108	trimethylbenzene; 1,2,4-	95-63-6	VOCs	not in HHRAP		1.0E-02				
109	trimethylbenzene; 1,3,5-	108-67-8	VOCs	8.58E+01		1.0E-02		4.5E+01	4.5E+01	Tribal consumption-noncancer
110	vanadium and compounds	7440-62-2	Metals	not in HHRAP		5.0E-03				
111	vanillin (4-hydroxy-3-methoxybenzaldehyde)	121-33-5	SVOCs	not in HHRAP						
112	xylene; m-	108-38-3	VOCs	5.81E+01		2.0E-01		1.3E+03	1.3E+03	Tribal consumption-noncancer
113	xylene; o-	95-47-6	VOCs	4.86E+01		2.0E-01		1.6E+03	1.6E+03	Tribal consumption-noncancer
114	xylene; p-	106-42-3	VOCs	4.86E+01		2.0E-01		1.6E+03	1.6E+03	Tribal consumption-noncancer
115	xylenes (total)	1330-20-7	VOCs	not in HHRAP		2.0E-01				
116	zinc and compounds (see notes re: hardness)	7440-66-6	Metals	2.06E+03		3.0E-01		5.6E+01	5.6E+01	Tribal consumption-noncancer
117										
118	Blank cells indicate a value is not available									
119	L/kg FW - liter per kilogram fresh weight									

	A	B	C	D	E	F	G	H	I	J
1							**Groundwater to Protect Surface Water - Tribal Fish and Shellfish Consumption**			
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals GROUNDWATER TO PROTECT SURFACE WATER: TRIBAL FISH AND SHELLFISH CONSUMPTION**	**CAS #**	**Chemical Data Group**	Bioconcentration Factor (BCF) fish fresh weight (L/kg FW) (see notes)	Oral Cancer Slope Factor (SFO) $(mg/kg\text{-}day)^{-1}$ (see notes)	Oral Reference Dose (RfD_o) (mg/kg-day) (see notes)	**EPA Tribal fish consumption, cancer** (µg/L)	**EPA Tribal fish consumption child, noncancer** (µg/L)	**Lowest of Tribal Fish and Shellfish Consumption values (columns G-H) (µg/L)**	**Rationale**
120	mg/kg-day - milligram per kilogram day									
121	ug/L - microgram per liter									

Following are inputs, notes, and equations associated with spreadsheet 1b. Tribal Calculations

Tribal fish and shellfish consumption scenario for calculating surface water cleanup levels:

	Tribal adult	Tribal child
Body weight, kg	81.8	15
Averaging time, years (cancer)	70	70
Averaging time, years (noncancer)	64	6
CF1 - kg/g	0.001	
CF2 - mg/µg	0.001	
Target hazard quotient	1	1
Target risk	1.00E-06	1.00E-06
Fish consumption rate - g/day	98	39
Diet fraction	1	1
Exposure frequency - days/yr	365	365
Exposure duration - years	64	6
Exposure duration - 0 - 2 yrs	2	
Exposure duration - 2 - 6 yrs	4	
Exposure duration - 6 - 16 yrs	10	
Exposure duration - 16 - 70 yrs	54	
Adjusted early-life exposure consumption rate - (g-yr/kg-day)	184	
Age-adjusted consumption rate (g-yr/kg-day)	92	

Bioconcentration Factors: BCFs are for the most part from EPA Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities, Companion Database, https://archive.epa.gov/epawaste/hazard/tsd/td/web/html/risk.html
Barium: BCF of 100 L/kg based on average of USEPA RAIS values of 4 L/kg, an ATSDR value of 100 L/kg for marine animals, and a study value for freshwater fish of 129 L/kg, as proposed by nearby facility on Lower Duwamish, Boeing Plant 2.
Copper: BCF from the 1980 EPA Ambient Water Quality Criteria document for copper, page C-18: If the values of zero and 290 are used with the consumption data, the weighted average bioconcentration factor for copper and the edible portion of all freshwater and estuarine aquatic organisms consumed by Americans is calculated to be 36.
Aroclor: Aroclor 1260 uses the BCF for Aroclor 1254 as a surrogate, as there is no BCF for Aroclor 1260 in the HHRAP.

Oral cancer slope factor and oral reference dose values were obtained from EPA Regional Screening Levels (RSLs) tables, updated May 2020: https://www.epa.gov/risk/regional-screening-levels-rsls

Equations:

Risk-based PRGs associated with consumption of fish and shellfish are calculated as:

$$PRG_{water} = \frac{THQ \times BW_c \times AT_{nc}}{ED_c \times EF \times \frac{1}{RfD} \times CR_c \times \mathrm{BCF} \times 0.001\,\mathrm{mg}/\mu\mathrm{g} \times 0.001\,kg/g}$$

PRGs based on a cancer endpoint are calculated by averaging child and adult exposures:

$$PRG_{water} = \frac{TR \times AT_c}{EF \times CR_{adj} \times CSF \times BCF \times 0.001\, mg / \mu g \times 0.001\, kg / g}$$

where:

$$CR_{adj} = \frac{ED_c \times CR_c}{BW_c} + \frac{ED_a \times CR_a}{BW_a}$$

and:

PRG_{water}	=	concentration in water (µg/L)
CR_c	=	consumption rate of fish or shellfish – child (g/day, wet-weight)
CR_a	=	consumption rate of fish or shellfish – adult (g/day, wet-weight)
$CR_{f\text{-}adj}$	=	consumption rate of fish or shellfish – age-adjusted (g/day – wet weight)
EF	=	exposure frequency (days/year)
ED_c	=	exposure duration – child (years)
ED_a	=	exposure duration – adult (years)
BW_c	=	body weight – child (kg)
BW_a	=	body weight – adult (kg)
AT_{nc}	=	averaging time, noncancer (days)
AT_c	=	averaging time, cancer (days)
BCF	=	bioconcentration factor (L/kg)
CSF	=	cancer slope factor $(mg/kg\text{-}day)^{-1}$
RfD	=	reference dose (mg/kg-day)
THQ	=	target hazard quotient
TR	=	target cancer risk

Risk-based PRGs for contaminants known to be mutagenic (cPAHs) incorporate the age-dependent adjustment factors (ADAFs) of 10 and 3, respectively, for exposures occurring before 2 years of age and

$$PRG_{water} = \frac{TR \times AT_c}{EF \times CSF \times CR_{adj-m} \times \mathrm{BCF} \times 10^{-3}\, kg / g \times 10^{-3}\ \mathrm{mg}/\mu g}$$

where:

$$CR_{adj-m} = \left(\frac{(ED_{0\text{-}2} \times CR_c) \times 10}{BW_c} + \frac{(ED_{2\text{-}6} \times CR_c) \times 3}{BW_c} + \frac{(ED_{6\text{-}16} \times CR_a) \times 3}{BW_a} + \frac{(ED_{16\text{-}30} \times CR_a) \times 1}{BW_a} \right)$$

and:

PRG_{water}	=	concentration in water (µg/L)

	A	B	C	D	E	F	G	H	I	J
86		CR_a	=	adult consumption rate (g/day)						
87		CR_c	=	child consumption rate (g/day)						
88		CR_{adj-m}	=	age-adjusted consumption rate - mutagens (g-yr/kg-day)						
89		EF	=	exposure frequency (days/year)						
90		ED_{0-2}	=	exposure duration ages 0-2 (years)						
91		ED_{2-6}	=	exposure duration ages 2-6 (years)						
92		ED_{6-16}	=	exposure duration ages 6-16 (years)						
93		ED_{16-30}	=	exposure duration ages 16-30 (years)						
94		BW_a	=	adult body weight (kg)						
95		BW_c	=	child body weight (kg)						
96		AT_c	=	averaging time, carcinogens (days)						
97		CSF	=	cancer slope factor $(mg/kg\text{-}day)^{-1}$						
98		TR	=	target cancer risk						
99										
100										

	A	B	C	D	E	F	G	H
1				**Residential Soil***				
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SOIL**	**CAS #**	**Chemical Data Group**	EPA Regional Screening Level (RSL) cancer risk=1E-6 (mg/kg)	EPA Regional Screening Level (RSL) noncancer HQ=1 (mg/kg)	Washington State (Puget Sound) Background (mg/kg)	**Lowest of Residential Soil RSL Values (or Background if Higher)** (mg/kg)	**Rationale**
3	acenaphthene	83-32-9	PAHs		3.6E+03		3.6E+03	RSL noncancer
4	acenaphthylene	208-96-8	PAHs					
5	acetone	67-64-1	VOCs		6.1E+04		6.1E+04	RSL noncancer
6	aldrin (see notes re: aldrin and dieldrin)	309-00-2	Pesticides	3.9E-02	2.3E+00		3.9E-02	RSL cancer
7	aluminum	7429-90-5	Metals		7.7E+04	3.3E+04	7.7E+04	RSL noncancer
8	anthracene	120-12-7	PAHs		1.8E+04		1.8E+04	RSL noncancer
9	antimony (metallic)	7440-36-0	Metals		3.1E+01		3.1E+01	RSL noncancer
10	aroclor 1254	11097-69-1	PCBs	2.4E-01	1.2E+00		2.4E-01	RSL cancer
11	aroclor 1260	11096-82-5	PCBs	2.4E-01			2.4E-01	RSL cancer
12	arsenic, inorganic	7440-38-2	Metals	6.8E-01	3.5E+01	7.3E+00	7.3E+00	Puget Sound Background
13	barium and compounds	7440-39-3	Metals		1.5E+04		1.5E+04	RSL noncancer
14	benzene	71-43-2	VOCs	1.2E+00	8.2E+01		1.2E+00	RSL cancer
15	benzo[a]anthracene	56-55-3	cPAHs	1.1E+00			1.1E+00	RSL cancer
16	benzo[a]pyrene	50-32-8	cPAHs	1.1E-01	1.8E+01		1.1E-01	RSL cancer
17	benzo[b]fluoranthene	205-99-2	cPAHs	1.1E+00			1.1E+00	RSL cancer
18	benzo[g,h,i]perylene	191-24-2	PAHs					
19	benzo[k]fluoranthene	207-08-9	cPAHs	1.1E+01			1.1E+01	RSL cancer
20	benzoic acid	65-85-0	SVOCs		2.5E+05		2.5E+05	RSL noncancer
21	benzyl alcohol	100-51-6	SVOCs		6.3E+03		6.3E+03	RSL noncancer
22	beryllium	7440-41-7	Metals	1.6E+03	1.6E+02	6.1E-01	1.6E+02	RSL noncancer
23	bis(2-ethylhexyl)-phthalate	117-81-7	Phthalates	3.9E+01	1.3E+03		3.9E+01	RSL cancer
24	bromoform	75-25-2	VOCs	1.9E+01	1.6E+03		1.9E+01	RSL cancer
25	butyl benzyl phthalate	85-68-7	Phthalates	2.9E+02	1.3E+04		2.9E+02	RSL cancer
26	butylbenzene; sec-	135-98-8	VOCs		7.8E+03		7.8E+03	RSL noncancer
27	cadmium (food/diet)	7440-43-9	Metals	2.1E+03	7.1E+01	7.7E-01	7.1E+01	RSL noncancer
28	cadmium (water) (see notes re: hardness)	7440-43-9	Metals					
29	calcium	203863-17-6	Metals					
30	carbazole	86-74-8	PAHs					
31	carbon disulfide	75-15-0	VOCs		7.7E+02		7.7E+02	RSL noncancer
32	chlordane (technical)	12789-03-6	Pesticides	1.7E+00	3.5E+01		1.7E+00	RSL cancer
33	chlordane	57-74-9	Pesticides					
34	chromium (III), insoluble salts (see notes re: hardness)	16065-83-1	Metals		1.2E+05		1.2E+05	RSL noncancer
35	chromium (total)	7440-47-3	Metals			4.8E+01	4.8E+01	Puget Sound Background
36	chromium (VI)	18540-29-9	Metals	3.0E-01	2.3E+02		3.0E-01	RSL cancer
37	chrysene	218-01-9	cPAHs	1.1E+02			1.1E+02	RSL cancer
38	cobalt	7440-48-4	Metals	4.2E+02	2.3E+01		2.3E+01	RSL noncancer
39	copper (see notes re: hardness)	7440-50-8	Metals		3.1E+03	3.6E+01	3.1E+03	RSL noncancer

	A	B	C	D	E	F	G	H
1				Residential Soil*				
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SOIL**	**CAS #**	**Chemical Data Group**	EPA Regional Screening Level (RSL) cancer risk=1E-6 (mg/kg)	EPA Regional Screening Level (RSL) noncancer HQ=1 (mg/kg)	Washington State (Puget Sound) Background (mg/kg)	**Lowest of Residential Soil RSL Values (or Background if Higher)** (mg/kg)	**Rationale**
40	DDD, 4,4'-	72-54-8	Pesticides	2.3E+00	1.9E+00		1.9E+00	RSL noncancer
41	DDE, 4,4'-	72-55-9	Pesticides	2.0E+00	2.3E+01		2.0E+00	RSL cancer
42	DDT, 4,4'-	50-29-3	Pesticides	1.9E+00	3.7E+01		1.9E+00	RSL cancer
43	dibenz[a,h]anthracene	53-70-3	cPAHs	1.1E-01			1.1E-01	RSL cancer
44	dibenzofuran	132-64-9	PAHs		7.3E+01		7.3E+01	RSL noncancer
45	dichlorobenzene; 1,2-	95-50-1	VOCs		1.8E+03		1.8E+03	RSL noncancer
46	dichlorobenzene; 1,4-	106-46-7	VOCs	2.6E+00	3.4E+03		2.6E+00	RSL cancer
47	dichloroethylene; 1,2-,cis	156-59-2	VOCs		1.6E+02		1.6E+02	RSL noncancer
48	dieldrin (see notes re: aldrin and dieldrin)	60-57-1	Pesticides	3.4E-02	3.2E+00		3.4E-02	RSL cancer
49	diethyl phthalate	84-66-2	Phthalates		5.1E+04		5.1E+04	RSL noncancer
50	dimethylphenol; 2,4-	105-67-9	Phenols		1.3E+03		1.3E+03	RSL noncancer
51	dimethyl phthalate	131-11-3	Phthalates					
52	di-n-butyl-phthalate (dibutyl phthalate)	84-74-2	Phthalates		6.3E+03		6.3E+03	RSL noncancer
53	di-n-octyl phthalate	117-84-0	Phthalates		6.3E+02		6.3E+02	RSL noncancer
54	endosulfan	115-29-7	Pesticides		4.7E+02		4.7E+02	RSL noncancer
55	endosulfan I (alpha)	959-98-8	Pesticides					
56	endosulfan II (beta)	33213-65-9	Pesticides					
57	endosulfan sulfate	1031-07-8	Pesticides		3.8E+02		3.8E+02	RSL noncancer
58	endrin	72-20-8	Pesticides		1.9E+01		1.9E+01	RSL noncancer
59	endrin aldehyde	7421-93-4	Pesticides					
60	endrin ketone	53494-70-5	Pesticides					
61	ethylbenzene	100-41-4	VOCs	5.8E+00	3.4E+03		5.8E+00	RSL cancer
62	fluoranthene	206-44-0	PAHs		2.4E+03		2.4E+03	RSL noncancer
63	fluorene	86-73-7	PAHs		2.4E+03		2.4E+03	RSL noncancer
64	formaldehyde	50-00-0	VOCs	1.1E+01	7.6E+02		1.1E+01	RSL cancer
65	hexachlorobenzene	118-74-1	Pesticides	2.1E-01	6.3E+01		2.1E-01	RSL cancer
66	hexachlorocyclohexane, delta- (delta-BHC)	319-86-8	Pesticides					
67	indeno[1,2,3-cd]pyrene	193-39-5	cPAHs	1.1E+00			1.1E+00	RSL cancer
68	iron	7439-89-6	Metals		5.5E+04	3.6E+04	5.5E+04	RSL noncancer
69	isopropyltoluene, 4- (cymene, p-)	99-87-6	VOCs					
70	lead (see notes re: hardness)	7439-92-1	Metals		4.0E+02	1.7E+01	4.0E+02	RSL noncancer
71	magnesium	7439-95-4	Metals					
72	manganese (diet)	7439-96-5	Metals					
73	manganese (non-diet)	7439-96-5	Metals		1.8E+03	1.1E+03	1.8E+03	RSL noncancer
74	mercury (elemental)	7439-97-6	Metals		1.1E+01	7.0E-02	1.1E+01	RSL noncancer
75	methoxychlor	72-43-5	Pesticides		3.2E+02		3.2E+02	RSL noncancer
76	methyl ethyl ketone (butanone, 2-)	78-93-3	VOCs		2.7E+04		2.7E+04	RSL noncancer

	A	B	C	D	E	F	G	H
1				**Residential Soil***				
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SOIL**	**CAS #**	**Chemical Data Group**	EPA Regional Screening Level (RSL) cancer risk=1E-6 (mg/kg)	EPA Regional Screening Level (RSL) noncancer HQ=1 (mg/kg)	Washington State (Puget Sound) Background (mg/kg)	**Lowest of Residential Soil RSL Values (or Background if Higher)** (mg/kg)	**Rationale**
77	methyl naphthalene; 2-	91-57-6	PAHs		2.4E+02		2.4E+02	RSL noncancer
78	methylene chloride	75-09-2	VOCs	5.7E+01	3.5E+02		5.7E+01	RSL cancer
79	methylphenol, 2- (cresol, o-)	95-48-7	Phenols		3.2E+03		3.2E+03	RSL noncancer
80	methylphenol, 4- (cresol, p-)	106-44-5	Phenols		6.3E+03		6.3E+03	RSL noncancer
81	naphthalene	91-20-3	PAHs	2.0E+00	1.3E+02		2.0E+00	RSL cancer
82	nickel (soluble salts) (see notes re: hardness)	7440-02-0	Metals	1.5E+04	1.5E+03	3.8E+01	1.5E+03	RSL noncancer
83	nitrosodiphenylamine, N-	86-30-6	SVOCs	1.1E+02			1.1E+02	RSL cancer
84	pentachlorophenol	87-86-5	SVOCs	1.0E+00	2.5E+02		1.0E+00	RSL cancer
85	pH	--	pH					
86	phenanthrene	85-01-8	PAHs					
87	phenol	108-95-2	Phenols		1.9E+04		1.9E+04	RSL noncancer
88	phenylenediamine, 1,4- (phenylenediamine, p-)	106-50-3	SVOCs		6.3E+01		6.3E+01	RSL noncancer
89	polychlorinated biphenyls; total PCBs	1336-36-3	PCBs	2.3E-01			2.3E-01	RSL cancer
90	potassium	7440-09 7	Metals					
91	propanol, 2- (isopropanol)	67-63-0	VOCs		5.6E+03		5.6E+03	RSL noncancer
92	pyrene	129-00-0	PAHs		1.8E+03		1.8E+03	RSL noncancer
93	selenium and compounds	7782-49-2	Metals		3.9E+02		3.9E+02	RSL noncancer
94	silver	7440-22-4	Metals		3.9E+02		3.9E+02	RSL noncancer
95	sodium	82115-62-6	Metals					
96	tetrachloroethylene	127-18-4	VOCs	2.4E+01	8.1E+01		2.4E+01	RSL cancer
97	tin	7440-31-5	Metals		4.7E+04		4.7E+04	RSL noncancer
98	toluene	108-88-3	VOCs		4.9E+03		4.9E+03	RSL noncancer
99	total petroleum hydrocarbons (aliphatic high)	E1790670	TPH		2.3E+05		2.3E+05	RSL noncancer
100	total petroleum hydrocarbons (aliphatic low)	E1790666	TPH		5.2E+02		5.2E+02	RSL noncancer
101	total petroleum hydrocarbons (aliphatic medium)	E1790668	TPH		9.6E+01		9.6E+01	RSL noncancer
102	total petroleum hydrocarbons (aromatic high)	E1790676	TPH		2.4E+03		2.4E+03	RSL noncancer
103	total petroleum hydrocarbons (aromatic low)	E1790672	TPH		8.2E+01		8.2E+01	RSL noncancer
104	total petroleum hydrocarbons (aromatic medium)	E1790674	TPH		9.7E+01		9.7E+01	RSL noncancer
105	trichlorobenzene, 1,2,4-	120-82-1	VOCs	2.4E+01	5.8E+01		2.4E+01	RSL cancer
106	trichloroethylene (see notes)	79-01-6	VOCs	9.4E-01	4.1E+00		9.4E-01	RSL cancer
107	trichlorophenol, 2,4,5-	95-95-4	Phenols		6.3E+03		6.3E+03	RSL noncancer
108	trimethylbenzene; 1,2,4-	95-63-6	VOCs		3.0E+02		3.0E+02	RSL noncancer
109	trimethylbenzene; 1,3,5-	108-67-8	VOCs		2.7E+02		2.7E+02	RSL noncancer
110	vanadium and compounds	7440-62-2	Metals		3.9E+02		3.9E+02	RSL noncancer
111	vanillin (4-hydroxy-3-methoxybenzaldehyde)	121-33-5	SVOCs					
112	xylene; m-	108-38-3	VOCs		5.5E+02		5.5E+02	RSL noncancer
113	xylene; o-	95-47-6	VOCs		6.5E+02		6.5E+02	RSL noncancer

	A	B	C	D	E	F	G	H
1				**Residential Soil***				
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SOIL**	**CAS #**	**Chemical Data Group**	EPA Regional Screening Level (RSL) cancer risk=1E-6 (mg/kg)	EPA Regional Screening Level (RSL) noncancer HQ=1 (mg/kg)	Washington State (Puget Sound) Background (mg/kg)	**Lowest of Residential Soil RSL Values (or Background if Higher)** (mg/kg)	**Rationale**
114	xylene; p-	106-42-3	VOCs		5.6E+02		5.6E+02	RSL noncancer
115	xylenes (total)	1330-20-7	VOCs		5.8E+02		5.8E+02	RSL noncancer
116	zinc and compounds (see notes re: hardness)	7440-66-6	Metals		2.3E+04	8.5E+01	2.3E+04	RSL noncancer
117								
118	* - Residential and Composite Worker Soil values apply throughout the vadose zone. Soil to Protect Sediment values apply throughout the vadose zone from the barrier wall to the tideflats.							
119	Blank cells indicate a value is not available							
120	mg/kg - milligram per kilogram							

	A	B	C	I	J	K	L	M	N	O	P	Q	R	S
1					**Composite Worker Soil***						**Soil to Protect Sediment***		**Residential Soil to Protect Groundwater***	
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SOIL**	**CAS #**	**Chemical Data Group**		EPA Regional Screening Level (RSL) cancer risk=1E-6 (mg/kg)	EPA Regional Screening Level (RSL) noncancer HQ=1 (mg/kg)	Washington State (Puget Sound) Background (mg/kg)	**Lowest of Composite Worker Soil RSL Values (or Background if Higher)** (mg/kg)	**Rationale**		**LDW PCUL SL-8** Protect Sediment via Bank Erosion (mg/kg)		EPA Regional Screening Level (RSL) Soil Screening Level to Protect Groundwater (Risk-based) (mg/kg)	EPA Regional Screening Level (RSL) Soil Screening Level to Protect Groundwater (MCL-based) (mg/kg)
3	acenaphthene	83-32-9	PAHs			4.5E+04		4.5E+04	RSL noncancer		5.0E-01		5.5E+00	
4	acenaphthylene	208-96-8	PAHs								1.3E+00			
5	acetone	67-64-1	VOCs			6.7E+05		6.7E+05	RSL noncancer				2.9E+00	
6	aldrin (see notes re: aldrin and dieldrin)	309-00-2	Pesticides		1.8E-01	3.5E+01		1.8E-01	RSL cancer		1.0E-04		1.5E-04	
7	aluminum	7429-90-5	Metals			1.1E+06	3.3E+04	1.1E+06	RSL noncancer		2.4E+05		3.0E+04	
8	anthracene	120-12-7	PAHs			2.3E+05		2.3E+05	RSL noncancer		9.6E-01		5.8E+01	
9	antimony (metallic)	7440-36-0	Metals			4.7E+02		4.7E+02	RSL noncancer		9.7E+01		3.5E-01	2.7E-01
10	aroclor 1254	11097-69-1	PCBs		9.7E-01	1.5E+01		9.7E-01	RSL cancer				2.1E-03	
11	aroclor 1260	11096-82-5	PCBs		9.9E-01			9.9E-01	RSL cancer				5.5E-03	
12	arsenic, inorganic	7440-38-2	Metals		3.0E+00	4.8E+02	7.3E+00	7.3E+00	Puget Sound background		7.0E+00		1.5E-03	2.9E-01
13	barium and compounds	7440-39-3	Metals			2.2E+05		2.2E+05	RSL noncancer		4.9E+04		1.6E+02	8.2E+01
14	benzene	71-43-2	VOCs		5.1E+00	4.2E+02		5.1E+00	RSL cancer				2.3E-04	2.6E-03
15	benzo[a]anthracene	56-55-3	cPAHs		2.1E+01			2.1E+01	RSL cancer		1.3E+00		1.1E-02	
16	benzo[a]pyrene	50-32-8	cPAHs		2.1E+00	2.2E+02		2.1E+00	RSL cancer		1.6E+00		2.9E-02	2.4E-01
17	benzo[b]fluoranthene	205-99-2	cPAHs		2.1E+01			2.1E+01	RSL cancer				3.0E-01	
18	benzo[g,h,i]perylene	191-24-2	PAHs								6.7E-01			
19	benzo[k]fluoranthene	207-08-9	cPAHs		2.1E+02			2.1E+02	RSL cancer				2.9E+00	
20	benzoic acid	65-85-0	SVOCs			3.3E+06		3.3E+06	RSL noncancer		6.5E-01		1.5E+01	
21	benzyl alcohol	100-51-6	SVOCs			8.2E+04		8.2E+04	RSL noncancer		5.7E-02		4.8E-01	
22	beryllium	7440-41-7	Metals		6.9E+03	2.3E+03	6.1E-01	2.3E+03	RSL noncancer		4.9E+02		2.0E+01	3.2E+00
23	bis(2-ethylhexyl)-phthalate	117-81-7	Phthalates		1.6E+02	1.6E+04		1.6E+02	RSL cancer		1.3E+00		1.3E+00	1.4E+00
24	bromoform	75-25-2	VOCs		8.6E+01	2.3E+04		8.6E+01	RSL cancer				8.7E-04	2.1E-02
25	butyl benzyl phthalate	85-68-7	Phthalates		1.2E+03	1.6E+05		1.2E+03	RSL cancer		6.3E-02		2.4E-01	
26	butylbenzene; sec-	135-98-8	VOCs			1.2E+05		1.2E+05	RSL noncancer				5.9E+00	
27	cadmium (food/diet)	7440-43-9	Metals		9.3E+03	9.8E+02	7.7E-01	9.8E+02	RSL noncancer		5.1E+00			
28	cadmium (water) (see notes re: hardness)	7440-43-9	Metals										6.9E-01	3.8E-01
29	calcium	203863-17-6	Metals											
30	carbazole	86-74-8	PAHs											
31	carbon disulfide	75-15-0	VOCs			3.5E+03		3.5E+03	RSL noncancer				2.4E-01	
32	chlordane (technical)	12789-03-6	Pesticides		7.7E+00	4.5E+02		7.7E+00	RSL cancer				2.7E-03	2.7E-01
33	chlordane	57-74-9	Pesticides											
34	chromium (III), insoluble salts (see notes re: hardness)	16065-83-1	Metals			1.8E+06		1.8E+06	RSL noncancer		3.7E+05		4.0E+07	
35	chromium (total)	7440-47-3	Metals				4.8E+01	4.8E+01	Puget Sound background		2.6E+02			1.8E+05
36	chromium (VI)	18540-29-9	Metals		6.3E+00	3.5E+03		6.3E+00	RSL cancer		7.3E+02		6.7E-04	
37	chrysene	218-01-9	cPAHs		2.1E+03			2.1E+03	RSL cancer		1.4E+00		9.1E+00	
38	cobalt	7440-48-4	Metals		1.9E+03	3.5E+02		3.5E+02	RSL noncancer		7.3E+01		2.7E-01	
39	copper (see notes re: hardness)	7440-50-8	Metals			4.7E+04	3.6E+01	4.7E+04	RSL noncancer		3.9E+02		2.8E+01	4.6E+01

	A	B	C	I	J	K	L	M	N	O	P	Q	R	S
1					**Composite Worker Soil***						**Soil to Protect Sediment***		**Residential Soil to Protect Groundwater***	
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SOIL**	**CAS #**	**Chemical Data Group**		EPA Regional Screening Level (RSL) cancer risk=1E-6 (mg/kg)	EPA Regional Screening Level (RSL) noncancer HQ=1 (mg/kg)	Washington State (Puget Sound) Background (mg/kg)	**Lowest of Composite Worker Soil RSL Values (or Background if Higher)** (mg/kg)	**Rationale**		**LDW PCUL SL-8** Protect Sediment via Bank Erosion (mg/kg)		EPA Regional Screening Level (RSL) Soil Screening Level to Protect Groundwater (Risk-based) (mg/kg)	EPA Regional Screening Level (RSL) Soil Screening Level to Protect Groundwater (MCL-based) (mg/kg)
40	DDD, 4,4'-	72-54-8	Pesticides		9.6E+00	2.5E+01		9.6E+00	RSL cancer		6.8E+00		7.5E-03	
41	DDE, 4,4'-	72-55-9	Pesticides		9.3E+00	3.5E+02		9.3E+00	RSL cancer		6.3E+00		1.1E-02	
42	DDT, 4,4'-	50-29-3	Pesticides		8.5E+00	5.2E+02		8.5E+00	RSL cancer		1.0E-04		7.7E-02	
43	dibenz[a,h]anthracene	53-70-3	cPAHs								2.3E-01		9.6E-02	
44	dibenzofuran	132-64-9	PAHs			1.0E+03		1.0E+03	RSL noncancer		5.4E-01		1.5E-01	
45	dichlorobenzene; 1,2-	95-50-1	VOCs			9.3E+03		9.3E+03	RSL noncancer		3.6E-02		3.0E-01	5.8E-01
46	dichlorobenzene; 1,4-	106-46-7	VOCs		1.1E+01	2.5E+04		1.1E+01	RSL cancer		1.1E-01		4.6E-04	7.2E-02
47	dichloroethylene; 1,2-,cis	156-59-2	VOCs			2.3E+03		2.3E+03	RSL noncancer				1.1E-02	2.1E-02
48	dieldrin (see notes re: aldrin and dieldrin)	60-57-1	Pesticides		1.4E-01	4.1E+01		1.4E-01	RSL cancer		1.0E-04		7.1E-05	
49	diethyl phthalate	84-66-2	Phthalates			6.6E+05		6.6E+05	RSL noncancer		2.0E-01		6.1E+00	
50	dimethylphenol; 2,4-	105-67-9	Phenols			1.6E+04		1.6E+04	RSL noncancer		2.9E-02		4.2E-01	
51	dimethyl phthalate	131-11-3	Phthalates								7.1E-02			
52	di-n-butyl-phthalate (dibutyl phthalate)	84-74-2	Phthalates			8.2E+04		8.2E+04	RSL noncancer		1.4E+00		2.3E+00	
53	di-n-octyl phthalate	117-84-0	Phthalates			8.2E+03		8.2E+03	RSL noncancer		6.2E+00		5.7E+01	
54	endosulfan	115-29-7	Pesticides			7.0E+03		7.0E+03	RSL noncancer				1.4E+00	
55	endosulfan I (alpha)	959-98-8	Pesticides								1.2E+03			
56	endosulfan II (beta)	33213-65-9	Pesticides								1.2E+03			
57	endosulfan sulfate	1031-07-8	Pesticides			4.9E+03		4.9E+03	RSL noncancer		1.2E+03		2.1E+00	
58	endrin	72-20-8	Pesticides			2.5E+02		2.5E+02	RSL noncancer		6.0E+01		9.2E-02	8.1E-02
59	endrin aldehyde	7421-93-4	Pesticides											
60	endrin ketone	53494-70-5	Pesticides											
61	ethylbenzene	100-41-4	VOCs		2.5E+01	2.0E+04		2.5E+01	RSL cancer				1.7E-03	7.9E-01
62	fluoranthene	206-44-0	PAHs			3.0E+04		3.0E+04	RSL noncancer		1.7E+00		8.9E+01	
63	fluorene	86-73-7	PAHs			3.0E+04		3.0E+04	RSL noncancer		5.4E-01		5.5E+00	
64	formaldehyde	50-00-0	VOCs		5.0E+01	3.3E+03		5.0E+01	RSL cancer				7.8E-05	
65	hexachlorobenzene	118-74-1	Pesticides		9.6E-01	9.3E+02		9.6E-01	RSL cancer		2.2E-02		1.2E-04	1.3E-02
66	hexachlorocyclohexane, delta- (delta-BHC)	319-86-8	Pesticides											
67	indeno[1,2,3-cd]pyrene	193-39-5	cPAHs		2.1E+01			2.1E+01	RSL cancer		6.0E-01		9.8E-01	
68	iron	7439-89-6	Metals			8.2E+05	3.6E+04	8.2E+05	RSL noncancer		1.7E+05		3.5E+02	
69	isopropyltoluene, 4- (cymene, p-)	99-87-6	VOCs											
70	lead (see notes re: hardness)	7439-92-1	Metals			8.0E+02	1.7E+01	8.0E+02	RSL noncancer		4.5E+02			1.4E+01
71	magnesium	7439-95-4	Metals											
72	manganese (diet)	7439-96-5	Metals								1.1E+04			
73	manganese (non-diet)	7439-96-5	Metals			2.6E+04	1.1E+03	2.6E+04	RSL noncancer				2.8E+01	
74	mercury (elemental)	7439-97-6	Metals			4.6E+01	7.0E-02	4.6E+01	RSL noncancer		4.1E-01		3.3E-02	1.0E-01
75	methoxychlor	72-43-5	Pesticides			4.1E+03		4.1E+03	RSL noncancer		1.0E+03		2.0E+00	2.2E+00
76	methyl ethyl ketone (butanone, 2-)	78-93-3	VOCs			1.9E+05		1.9E+05	RSL noncancer				1.2E+00	

	A	B	C	I	J	K	L	M	N	O	P	Q	R	S
1					**Composite Worker Soil***						**Soil to Protect Sediment***		**Residential Soil to Protect Groundwater***	
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SOIL**	**CAS #**	**Chemical Data Group**		EPA Regional Screening Level (RSL) cancer risk=1E-6 (mg/kg)	EPA Regional Screening Level (RSL) noncancer HQ=1 (mg/kg)	Washington State (Puget Sound) Background (mg/kg)	**Lowest of Composite Worker Soil RSL Values (or Background if Higher)** (mg/kg)	**Rationale**		**LDW PCUL SL-8** Protect Sediment via Bank Erosion (mg/kg)		EPA Regional Screening Level (RSL) Soil Screening Level to Protect Groundwater (Risk-based) (mg/kg)	EPA Regional Screening Level (RSL) Soil Screening Level to Protect Groundwater (MCL-based) (mg/kg)
77	methyl naphthalene; 2-	91-57-6	PAHs			3.0E+03		3.0E+03	RSL noncancer		6.7E-01		1.9E-01	
78	methylene chloride	75-09-2	VOCs		1.0E+03	3.2E+03		1.0E+03	RSL cancer				2.9E-03	1.3E-03
79	methylphenol, 2- (cresol, o-)	95-48-7	Phenols			4.1E+04		4.1E+04	RSL noncancer		6.3E-02		7.5E-01	
80	methylphenol, 4- (cresol, p-)	106-44-5	Phenols			8.2E+04		8.2E+04	RSL noncancer		6.7E-01		1.5E+00	
81	naphthalene	91-20-3	PAHs		8.6E+00	5.9E+02		8.6E+00	RSL cancer		2.1E+00		3.8E-04	
82	nickel (soluble salts) (see notes re: hardness)	7440-02-0	Metals		6.4E+04	2.2E+04	3.8E+01	2.2E+04	RSL noncancer		4.9E+03		2.6E+01	
83	nitrosodiphenylamine, N-	86-30-6	SVOCs		4.7E+02			4.7E+02	RSL cancer		2.8E-02		6.7E-02	
84	pentachlorophenol	87-86-5	SVOCs		4.0E+00	2.8E+03		4.0E+00	RSL cancer		3.6E-01		5.7E-05	1.4E-03
85	pH	--	pH											
86	phenanthrene	85-01-8	PAHs								1.5E+00			
87	phenol	108-95-2	Phenols			2.5E+05		2.5E+05	RSL noncancer		4.2E-01		3.3E+00	
88	phenylenediamine, 1,4- (phenylenediamine, p-)	106-50-3	SVOCs			8.2E+02		8.2E+02	RSL noncancer				5.4E-03	
89	polychlorinated biphenyls; total PCBs	1336-36-3	PCBs		9.4E-01			9.4E-01	RSL cancer		1.3E-01		6.8E-03	7.8E-02
90	potassium	7440-09 7	Metals											
91	propanol, 2- (isopropanol)	67-63-0	VOCs			2.4E+04		2.4E+04	RSL noncancer				8.4E-02	
92	pyrene	129-00-0	PAHs			2.3E+04		2.3E+04	RSL noncancer		2.6E+00		1.3E+01	
93	selenium and compounds	7782-49-2	Metals			5.8E+03		5.8E+03	RSL noncancer		1.2E+03		5.2E-01	2.6E-01
94	silver	7440-22-4	Metals			5.8E+03		5.8E+03	RSL noncancer		6.1E+00		8.0E-01	
95	sodium	82115-62-6	Metals											
96	tetrachloroethylene	127-18-4	VOCs		1.0E+02	3.9E+02		1.0E+02	RSL cancer				5.1E-03	2.3E-03
97	tin	7440-31-5	Metals			7.0E+05		7.0E+05	RSL noncancer		1.5E+05		3.0E+03	
98	toluene	108-88-3	VOCs			4.7E+04		4.7E+04	RSL noncancer				7.6E-01	6.9E-01
99	total petroleum hydrocarbons (aliphatic high)	E1790670	TPH			3.5E+06		3.5E+06	RSL noncancer				2.4E+03	
100	total petroleum hydrocarbons (aliphatic low)	E1790666	TPH			2.2E+03		2.2E+03	RSL noncancer				8.8E+00	
101	total petroleum hydrocarbons (aliphatic medium)	E1790668	TPH			4.4E+02		4.4E+02	RSL noncancer				1.5E+00	
102	total petroleum hydrocarbons (aromatic high)	E1790676	TPH			3.0E+04		3.0E+04	RSL noncancer				8.9E+01	
103	total petroleum hydrocarbons (aromatic low)	E1790672	TPH			4.2E+02		4.2E+02	RSL noncancer				1.7E-02	
104	total petroleum hydrocarbons (aromatic medium)	E1790674	TPH			5.6E+02		5.6E+02	RSL noncancer				2.3E-02	
105	trichlorobenzene, 1,2,4-	120-82-1	VOCs		1.1E+02	2.6E+02		1.1E+02	RSL cancer		3.1E-02		3.4E-03	2.0E-01
106	trichloroethylene (see notes)	79-01-6	VOCs		6.0E+00	1.9E+01		6.0E+00	RSL cancer				1.8E-04	1.8E-03
107	trichlorophenol, 2,4,5-	95-95-4	Phenols			8.2E+04		8.2E+04	RSL noncancer		2.0E+04		4.0E+00	
108	trimethylbenzene; 1,2,4-	95-63-6	VOCs			1.8E+03		1.8E+03	RSL noncancer				8.1E-02	
109	trimethylbenzene; 1,3,5-	108-67-8	VOCs			1.5E+03		1.5E+03	RSL noncancer				8.7E-02	
110	vanadium and compounds	7440-62-2	Metals			5.8E+03		5.8E+03	RSL noncancer		2.2E+03		8.6E+01	
111	vanillin (4-hydroxy-3-methoxybenzaldehyde)	121-33-5	SVOCs											
112	xylene; m-	108-38-3	VOCs			2.4E+03		2.4E+03	RSL noncancer				1.9E-01	
113	xylene; o-	95-47-6	VOCs			2.8E+03		2.8E+03	RSL noncancer				1.9E-01	

	A	B	C	I	J	K	L	M	N	O	P	Q	R	S
1					Composite Worker Soil*						Soil to Protect Sediment*		Residential Soil to Protect Groundwater*	
2	**Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SOIL**	**CAS #**	**Chemical Data Group**		EPA Regional Screening Level (RSL) cancer risk=1E-6 (mg/kg)	EPA Regional Screening Level (RSL) noncancer HQ=1 (mg/kg)	Washington State (Puget Sound) Background (mg/kg)	**Lowest of Composite Worker Soil RSL Values (or Background if Higher)** (mg/kg)	**Rationale**		**LDW PCUL SL-8** Protect Sediment via Bank Erosion (mg/kg)		EPA Regional Screening Level (RSL) Soil Screening Level to Protect Groundwater (Risk-based) (mg/kg)	EPA Regional Screening Level (RSL) Soil Screening Level to Protect Groundwater (MCL-based) (mg/kg)
114	xylene; p-	106-42-3	VOCs			2.4E+03		2.4E+03	RSL noncancer				1.9E-01	
115	xylenes (total)	1330-20-7	VOCs			2.5E+03		2.5E+03	RSL noncancer				1.9E-01	9.9E+00
116	zinc and compounds (see notes re: hardness)	7440-66-6	Metals			3.5E+05	8.5E+01	3.5E+05	RSL noncancer		4.1E+02		3.7E+02	
117														
118	* - Residential and Composite Worker Soil values apply throughout the vadose zone. Soil to Protect Groundwater values apply to areas of contaminated soil.													
119	Blank cells indicate a value is not available													
120	mg/kg - milligram per kilogram													

Former Rhone-Poulenc Facility Updated Preliminary Remediation Goals SEDIMENT	Sediment Cleanup Objectives, Benthic Community [1]	Sediment Cleanup Levels, LDW ROD, Benthic Invertebrates [2]	Sediment Cleanup Levels, LDW ROD, Human Health and Ecological [3]
	mg/kg Dry Weight	mg/kg Dry Weight	mg/kg Dry Weight
Arsenic	57	57	7
Cadmium	5.1	5.1	
Chromium	260	260	
Copper	390	390	
Lead	450	450	
Mercury	0.41	0.41	
Silver	6.1	6.1	
Zinc	410	410	
	mg/kg Organic Carbon normalized	mg/kg Organic Carbon normalized	
1,2 Dichlorobenzene	2.3	2.3	
1,2,4 Trichlorobenzene	0.81	0.81	
1,4 Dichlorobenzene	3.1	3.1	
2-Methylnaphthalene	38	38	
Acenaphthene	16	16	
Acenaphthylene	66		
Anthracene	220	220	
Benz(a)anthracene	110	110	
Benzo (g,h,i) Perylene	31	31	
Benzo(a)pyrene	99	99	
Bis (2-ethylhexyl) Phthalate	47	47	
Butyl Benzyl Phthalate	4.9	4.9	
Chrysene	110	110	
Dibenzo (a,h) Anthracene	12	12	
Dibenzofuran	15		
Diethyl Phthalate	61		
Dimethyl Phthalate	53	53	
Di-n-butyl Phthalate	220		
Di-n-octyl Phthalate	58		
Fluoranthene	160	160	
Fluorene	23	23	
Hexachlorobenzene	0.38	0.38	
Hexachlorobutadiene	3.9		
HPAH	960		
Indeno(1,2,3 c,d) Pyrene	34	34	
LPAH	370		
Naphthalene	99	99	
N-Nitrosodiphenylamine	11	11	
Phenanthrene	100	100	
Pyrene	1000	1000	
Total Benzofluoranthenes	230	230	
Total PCBs	12	12	
	ug/kg Dry Weight	ug/kg Dry Weight	ug/kg Dry Weight
2,4 Dimethyl Phenol	29	29	
2-Methylphenol	63		
4-Methylphenol	670	670	
Benzoic Acid	650	650	
Benzyl Alcohol	57	57	
Pentachlorophenol	360	360	
Phenol	420	420	
Total PCBs			2

1 - From: WAC 173-204-562, Table III, Marine Sediment, Sediment Cleanup Objectives and Cleanup Screening Levels Chemical Criteria; Benthic Community
2 - From: Table 20, Ecological (Benthic Invertebrate) Sediment Cleanup Levels; Record of Decision Lower Duwamish Waterway, November 2014
3 - From: Table 19, Human Health and Ecological Sediment Cleanup Levels; Record of Decision Lower Duwamish Waterway, November 2014

LPAH per WAC 173-204-562: The LPAH criterion in Table III represents the sum of the following "low molecular weight polycyclic aromatic hydrocarbon" compounds: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds as listed.

HPAH per WAC 173-204-562: The HPAH criterion in Table III represents the sum of the following "high molecular weight polycyclic aromatic hydrocarbon" compounds: Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Total Benzofluoranthenes, Benzo(a)pyrene, Indeno(1,2,3,-c,d)pyrene, Dibenzo(a,h)anthracene, and Benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.

ug/kg - microgram per kilogram
mg/kg - milligram per kilogram

Former Rhone-Poulenc Facility Vapor Intrusion Screening Level Calculator Outputs November 2019	CAS #	Chemical Data Group	RESIDENTIAL				COMMERCIAL			
			Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=1) C_{sg},Target (μg/m^3)	Target Groundwater Concentration (TCR=1E-06 or THQ=1) C_{gw},Target (μg/L)	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$(μg/m^3)	Non-carcinogenic VISL THQ=1 $C_{ia,nc}$(μg/m^3)	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=1) C_{sg},Target (μg/m^3)	Target Groundwater Concentration (TCR=1E-06 or THQ=1) C_{gw},Target (μg/L)	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$(μg/m^3)	Non-carcinogenic VISL THQ=1 $C_{ia,nc}$(μg/m^3)
acetone	67-64-1	VOCs	1.07E+06	2.3E+07	-	3.2E+04	4.51E+06	9.5E+07	-	1.4E+05
aldrin (see notes re: aldrin and dieldrin)	309-00-2	Pesticides	1.91E-02	3.2E-01	5.7E-04	-	8.34E-02	1.4E+00	2.5E-03	-
aroclor 1254	11097-69-1	PCBs	1.64E-01	4.3E-01	4.9E-03	-	7.15E-01	1.9E+00	2.2E-02	-
aroclor 1260	11096-82-5	PCBs	1.64E-01	3.6E-01	4.9E-03	-	7.15E-01	1.6E+00	2.2E-02	-
benzene	71-43-2	VOCs	1.20E+01	1.6E+00	3.6E-01	3.1E+01	5.24E+01	6.9E+00	1.6E+00	1.3E+02
bromoform	75-25-2	VOCs	8.51E+01	1.2E+02	2.6E+00	-	3.72E+02	5.1E+02	1.1E+01	-
carbon disulfide	75-15-0	VOCs	2.43E+04	1.2E+03	-	7.3E+02	1.02E+05	5.2E+03	-	3.1E+03
chlordane (technical)	12789-03-6	Pesticides	9.36E-01	1.4E+01	2.8E-02	7.3E-01	4.09E+00	6.2E+01	1.2E-01	3.1E+00
DDE, 4,4'-	72-55-9	Pesticides	9.65E-01	1.7E+01	2.9E-02	-	4.21E+00	7.4E+01	1.3E-01	-
dichlorobenzene, 1,2-	95-50-1	VOCs	6.95E+03	2.7E+03	-	2.1E+02	2.92E+04	1.1E+04	-	8.8E+02
dichlorobenzene; 1,4-	106-46-7	VOCs	8.51E+00	2.6E+00	2.6E-01	8.3E+02	3.72E+01	1.1E+01	1.1E+00	3.5E+03
ethylbenzene	100-41-4	VOCs	3.74E+01	3.5E+00	1.1E+00	1.0E+03	1.64E+02	1.5E+01	4.9E+00	4.4E+03
formaldehyde	50-00-0	VOCs	7.20E+00	1.6E+04	2.2E-01	1.0E+01	3.14E+01	6.9E+04	9.4E-01	4.3E+01
hexachlorobenzene	118-74-1	SVOCs	2.03E-01	8.8E-02	6.1E-03	-	8.89E-01	3.8E-01	2.7E-02	-
mercury (elemental)	7439-97-6	Metals	1.04E+01	8.9E-01	-	3.1E-01	4.38E+01	3.7E+00	-	1.3E+00
methyl ethyl ketone (butanone, 2-)	78-93-3	VOCs	1.74E+05	2.2E+06	-	5.2E+03	7.30E+05	9.4E+06	-	2.2E+04
methylene chloride	75-09-2	VOCs	3.38E+03	7.6E+02	1.0E+02	6.3E+02	4.09E+04	9.2E+03	1.2E+03	2.6E+03
naphthalene	91-20-3	PAHs	2.75E+00	4.6E+00	8.3E-02	3.1E+00	1.20E+01	2.0E+01	3.6E-01	1.3E+01
polychlorinated biphenyls; total PCBs (high risk)	1336-36-3	PCBs	1.64E-01	2.9E-01	4.9E-03	-	7.15E-01	1.3E+00	2.2E-02	-
polychlorinated biphenyls; total PCBs (low risk)	1336-36-4	PCBs	9.36E-01	1.7E+00	2.8E-02	-	4.09E+00	7.2E+00	1.2E-01	-
polychlorinated biphenyls; total PCBs (lowest risk)	1336-36-5	PCBs	4.68E+00	8.3E+00	1.4E-01	-	2.04E+01	3.6E+01	6.1E-01	-
propanol, 2- (isopropanol)	67-63-0	VOCs	6.95E+03	6.3E+05	-	2.1E+02	2.92E+04	2.7E+06	-	8.8E+02
tetrachloroethylene	127-18-4	VOCs	3.60E+02	1.5E+01	1.1E+01	4.2E+01	1.57E+03	6.5E+01	4.7E+01	1.8E+02
toluene	108-88-3	VOCs	1.74E+05	1.9E+04	-	5.2E+03	7.30E+05	8.1E+04	-	2.2E+04
total petroleum hydrocarbons (aliphatic low)	-	TPH	6.95E+01	8.5E+00	-	6.3E+02	2.92E+02	3.6E+01	-	2.6E+03
total petroleum hydrocarbons (aliphatic medium)	-	TPH	1.59E+01	7.5E-01	-	1.0E+02	9.97E+01	3.2E+00	-	4.4E+02
total petroleum hydrocarbons (aromatic low)	-	TPH	2.09E+03	1.4E+02	-	3.1E+01	8.76E+03	5.8E+02	-	1.3E+02
total petroleum hydrocarbons (aromatic medium)	-	TPH	2.09E+03	1.6E+02	-	3.1E+00	8.76E+03	6.7E+02	-	1.3E+01
trichlorobenzene, 1,2,4-	120-82-1	VOCs	3.48E+03	3.6E+01	-	2.1E+00	1.46E+04	1.5E+02	-	8.8E+00
trichloroethylene (see notes)	79-01-6	VOCs	3.48E+03	1.2E+00	4.8E-01	2.1E+00	1.46E+04	7.4E+00	3.0E+00	8.8E+00
trimethylbenzene; 1,2,4-	95-63-6	VOCs	3.48E+03	2.5E+02	-	6.3E+01	1.46E+04	1.0E+03	-	2.6E+02
trimethylbenzene; 1,3,5-	108-67-8	VOCs	3.48E+03	1.8E+02	-	6.3E+01	1.46E+04	7.3E+02	-	2.6E+02
xylene; m-	108-38-3	VOCs	2.09E+04	3.6E+02	-	1.0E+02	8.76E+04	1.5E+03	-	4.4E+02
xylene; o-	95-47-6	VOCs	3.48E+03	4.9E+02	-	1.0E+02	1.46E+04	2.1E+03	-	4.4E+02
xylene; p-	106-42-3	VOCs	1.04E+03	3.7E+02	-	1.0E+02	4.38E+03	1.6E+03	-	4.4E+02
xylenes (total)	1330-20-7	VOCs	1.04E+02	3.9E+02	-	1.0E+02	4.38E+02	1.6E+03	-	4.4E+02

ug/L - microgram per liter
(μg/m^3) - microgram per cubic meter

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1	**Following are notes related to all spreadsheets**
2	
3	**Soil and Groundwater:** MTCA values are not included in the Soil spreadsheet because MTCA includes only ingestion exposure, not dermal or inhalation, as EPA does, which results in consistently higher cleanup levels for MTCA than RSLs for EPA. For consistency, MTCA values also are not included in the Groundwater spreadsheet.
4	**Significant Figures:** To consistently use two significant figures across all spreadsheets, the aquatic life and human health WQS values are shown as two significant figures instead of three per the original sources.
5	**Background Values:**
6	Surface Water -- Background concentrations for surface water via groundwater for three metals (As, Cu, Mn) were obtained from work on Boeing Plant 2 adjacent to the Lower Duwamish River Superfund site. (Environmental Partners, Inc., FLOYD|SNIDER, Golder Associates Inc., 2006, Boeing Plant 2, Seattle/Tukwila, Washington, Technical Memorandum: Development and Use of Background Values: Prepared for The Boeing Company, March 30)
7	Soil -- Background values were obtained from Puget Sound values provided in Table 7 in Ecology's October 1994 publication, "Natural Background Soil Metals Concentrations in Washington State" -- https://fortress.wa.gov/ecy/publications/summarypages/94115.html.
8	**Aldrin and Dieldrin, Water:** WAC 173-201A-240, Table 240 footnote e, states: "Aldrin is metabolically converted to Dieldrin. Therefore, the sum of the Aldrin and Dieldrin concentrations are compared with the Dieldrin criteria."
9	**Hardness:** For certain inorganic constituents (Cadmium, Chromium III, Copper, Lead, Nickel, and Zinc), aquatic fresh water acute surface water criteria (WAC and EPA AWQC) are hardness dependent and have been adjusted to the maximum hardness of 400 mg/L. See Chapter 173-201A WAC and EPA AWQC for calculations, and the following quote.
10	*"The WAC and EPA fresh water surface water criteria have been adjusted to hardness of 400 mg/L as CaCO3. The hardness of groundwater at R-P is as much as 1500 mg/L, while surface water criteria for hardness-based inorganics can be adjusted only up to 400 mg/L. Using values based on 400 mg/L runs the risk of overestimating these inorganics to aquatic species, as they are less toxic to aquatic life in harder water than they are in softer water. This tendency may be countered by a possible underestimation of total toxicity of the groundwater. This is because at such a high hardness as 1500 mg/L, the high calcium and magnesium concentrations may themselves begin to elicit toxicity. The higher anion concentrations in water of 1500 mg/L hardness, such as elevated carbonate and bicarbonate concentrations, combined with the elevated Ca and Mg concentrations, may result in an ionic strength of groundwater that is closer to that of estuarine water instead of fresh water. Such an elevated ionic strength in itself can adversely affect fresh water species, regardless of the concentration of metals such as Cd, Cu, Pb, etc."* [Courtesy of Burt Shephard, EPA R10 Risk Evaluation Branch, 02/10/2016]
11	**Values are not available for certain compounds that have been reported analytically for this site, such as:**
12	individual chlordane isomers (e.g., alpha-, gamma-); total cPAHs and total benzofluoranthenes; endosulfan I (alpha) and endosulfan II (beta)
13	**Trichloroethylene (TCE):** EPA Region 10 developed a guidance for addressing exposure to women of reproductive age, based on information in the IRIS documentation. https://ecology.wa.gov/DOE/files/33/33a04283-94c4-402d-a6be-220f05f32f7a.pdf Not-to-be-exceeded TCE concentrations are for average 21-day exposures to women of reproductive age and are to be evaluated separately from longer-term exposures to other populations. TCE concentrations for all media based on this exposure are not used as PRGs; rather, they should be considered for engineering and/or institutional controls. Groundwater: 3.4 ug/L; Residential Soil: 4.7 mg/kg HQ=1; Composite Worker Soil: 19.2 mg/kg HQ=1
14	**Vapor Intrusion:** The Vapor Intrusion worksheet contains key outputs from EPA's Vapor Intrusion Screening Level Calculator for chemicals previously detected in soil and groundwater at the Former Rhone-Poulenc Facility. Only those chemicals available in the calculator and considered to be "sufficiently volatile and toxic to pose inhalation risk via vapor intrusion" were retained in this spreadsheet. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator
15	**ONLINE SOURCES**
16	**Water:**
17	EPA Regional Screening Levels (RSLs), updated May 2020: https://www.epa.gov/risk/regional-screening-levels-rsls
18	Federal Maximum Contaminant Levels (MCLs): https://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants
19	EPA National Recommended Water Quality Criteria (Aquatic Life and Human Health Organism Only) (aka Ambient Water Quality Criteria - AWQC) per Section 304(a) of Clean Water Act (CWA): https://www.epa.gov/wqc/national-recommended-water-quality-criteria
20	WA State Department of Ecology, Water Quality Standards applicable to surface waters in the State of WA for Aquatic Life and Human Health (Organism Only), WAC 173-201A, Table 240: https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240 https://www.epa.gov/sites/production/files/2014-12/documents/wawqs.pdf
21	EPA Region 10 Framework for Selecting and Using Tribal Fish and Shellfish Consumption Rates for Risk-Based Decision Making at CERCLA and RCRA Cleanup Sites in Puget Sound and the Strait of Georgia: https://www.epa.gov/guidance/framework-selecting-and-using-tribal-fish-and-shellfish-consumption-rates-risk-based
22	WA State Department of Ecology, Lower Duwamish Waterway Preliminary Cleanup Level Workbook (May 2020) and Supplemental Information (May 2020), available from Ecology's LDW webpage: https://apps.ecology.wa.gov/gsp/Sitepage.aspx?csid=1643
23	**Soil:**
24	EPA Regional Screening Levels (RSLs), updated May 2020: https://www.epa.gov/risk/regional-screening-levels-rsls
25	WA State Department of Ecology, Lower Duwamish Waterway Preliminary Cleanup Level Workbook (May 2020) and Supplemental Information (May 2020), available from Ecology's LDW webpage: https://apps.ecology.wa.gov/gsp/Sitepage.aspx?csid=1643
26	**Vapor Intrusion:**
27	EPA's Vapor Intrusion Screening Level Calculator: https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator
28	**Sediment:**
29	Record of Decision, Lower Duwamish Waterway Superfund Site, November 2014: https://semspub.epa.gov/work/10/715975.pdf

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30	Sediment cleanup levels based on protection of the benthic community in marine and low salinity sediment, WAC 173-204-562, Table III, Marine Sediment, Sediment Cleanup Objectives and Cleanup Screening Levels Chemical Criteria

Acronyms

AWQC - Ambient Water Quality Criteria, EPA
CAS - Chemical Abstracts Service Registry Number
cPAH - carcinogenic polycyclic aromatic hydrocarbons
CWA - Clean Water Act
HHRAP - Human Health Risk Assessment Protocol, EPA
HPAH - high-molecular-weight PAH
HQ - hazard quotient
LDW - Lower Duwamish Waterway
LPAH - low-molecular-weight PAH
MCL - Federal Maximum Contaminant Level
MTCA - Model Toxics Control Act, WA State
PAH - polycyclic aromatic hydrocarbons
PCBs - polychlorinated biphenyls
PCUL - LDW Preliminary Cleanup Levels
RSL - Regional Screening Levels, EPA
SVOC - semivolatile organic compound
TCR - target cancer risk
THQ - target hazard quotient
TPH - total petroleum hydrocarbons
VISL - vapor intrusion screening level
VOC - volatile organic compound
WAC - WA Administrative Code
WQS - Water Quality Standards

Introduction

Corrective action is being conducted to clean up releases of hazardous waste and hazardous constituents at the former Rhone-Poulenc Facility (Facility) located at 9229 East Marginal Way South in Tukwila, Washington. This work is being performed by the current and former landowners under the oversight of the U.S. Environmental Protection Agency pursuant to Resource Conservation and Recovery Act (RCRA) Section 3008(h) Administrative Order on Consent No. 1091-11-20-3008(h) (Order), dated March 31, 1993, as amended.

This document establishes updated Preliminary Remediation Goals (PRGs) for the West Parcel of the Facility. The PRGs include preliminary cleanup levels for contaminants found in soil, groundwater, and sediment at the Facility. These values reflect up-to-date toxicity information and are consistent with the physical conditions and current and reasonably anticipated future exposure assumptions at the Facility. They are protective of human health and the environment. This document also identifies the points of compliance at which the PRGs must be met. This document supersedes PRGs previously published by the EPA in 2014 for this Facility.

Site History

The former Rhone-Poulenc Facility is located on about 750 feet of shoreline on the east side of the Lower Duwamish Waterway (LDW) just north of Slip 6, at approximately river mile 4.2. The West Parcel is bounded by the Museum of Flight and Raisbeck Aviation High School to the east, industrial property to the north, the LDW to the west, and Slip 6 to the south. Laucks Chemical Company began industrial operations at this site sometime prior to 1946. The Monsanto Industrial Chemicals Company purchased the property in 1946 and began operations at the plant, manufacturing a variety of chemical products including dry glues, resins, hardeners, and extenders. Monsanto also began producing vanillin (artificial vanilla) at the Facility in 1952. These manufacturing operations generated hazardous and nonhazardous byproducts. Rhone-Poulenc, Inc., purchased the Facility in 1986 and continued vanillin production until April of 1991, when chemical manufacturing operations ceased. In 1998, Container Properties, L.L.C. purchased the property for an intended use as a shipping center for ocean-going containers.

Investigation and cleanup of the Facility is being conducted under the above-referenced Order by former owners, including Solvay, Inc. (formerly Rhodia Inc.) and Bayer CropScience Inc. (corporate successors to the former Rhone-Poulenc company), and the current owner, Container Properties, L.L.C. These parties are collectively referred to as the Respondents. Investigations begun by the Respondents in 1985 detected releases of hazardous constituents to soil, groundwater, and sediments. Most of the contamination is located in the former processing and chemical storage areas.

Several interim cleanup measures have been conducted at the Facility. Polychlorinated biphenyls (PCBs) were removed from soils, process drains, and storm sewers at the Facility in 1995. A soil vapor extraction system was installed in 1999 and operated until 2002, removing an estimated 61,255 pounds of toluene and other volatile chemicals from the soil.

In July 2003, the Respondents constructed a subsurface barrier wall to prevent contaminated groundwater from continuing to discharge into the LDW. A groundwater pump-and-treat system provides additional groundwater control. The extracted groundwater is treated using granular activated carbon and discharged to the City of Tukwila sanitary sewer system. The barrier wall was designed to encircle the areas of historical releases to the extent possible but was constructed approximately 50 feet inland from the shoreline due to stability constraints and to allow for future shoreline habitat restoration. Contaminated soil and groundwater remain inside the barrier wall but contamination also is present in the soil, groundwater, and sediments outside the barrier wall along the LDW and Slip 6.

In 2006, the property underwent redevelopment and was split into two parcels. The East Parcel was extensively investigated. In December 2006, the EPA selected a final cleanup action for the East Parcel. The selected cleanup included removal of contaminated soils and installation of a biosparge/vent system to address an area where groundwater was contaminated with toluene above the cleanup standard. Soil removal was completed in 2006. The groundwater cleanup continued in a limited area in the southwest corner of the East Parcel. The EPA determined in 2017 that the East Parcel cleanup was fully complete with no controls required. This parcel was purchased and redeveloped by the Museum of Flight in 2006.

Manufacturing structures which remained on the West Parcel were demolished and removed from the site during the redevelopment in 2006. Several cleanup actions took place as part of this effort, including removal of areas of contaminated soil and waste materials in sumps and old pipelines. The West Parcel was regraded and paved as part of the redevelopment activities. It had been leased to Insurance Auto Auctions, Inc. for several years for the storage of wrecked cars but currently is vacant.

The PRGs established in this document provide the basis for evaluating and selecting a final comprehensive cleanup action for the West Parcel, including the uplands soil and groundwater, shoreline soils, and sediments.

Site Geology

The Rhone-Poulenc Facility was constructed on land that had been built up from the original tidal mudflat with about 10 feet of fill material. The fill materials consist generally of granular soil and sand with variable amounts of silt, gravel, and debris. Beneath the fill lies a fairly continuous unit of finer grained soils consisting of silt and silty sand. This finer grained unit has a thickness of approximately 8 to 15 feet and extends to a depth of 15 to 20 feet below ground surface. Beneath the finer grained unit is an interval of poorly graded sand. This layer dips gradually towards the southwest corner of the site and is located around 30 to 45 feet below ground surface. Beneath this lies a horizontally continuous unit of finer grained material consisting of silt, silty sands, and gravel to a depth of about 105 feet.

Two aquifers underlie the site: the Shallow Aquifer and the Deep Aquifer. The Shallow Aquifer is divided into upper and lower zones. The upper zone of the Shallow Aquifer is in the sandier layer and is found at approximately 15 to 40 feet below ground surface. The lower zone of the Shallow Aquifer is the siltier portion and is found at approximately 45 to 70 feet below ground surface. The Shallow Aquifer and Deep Aquifer are separated by a low-permeability silt aquitard. The top of the Deep Aquifer is approximately 83 feet below ground surface.

The Facility is bounded on two sides by the LDW and Slip 6 and includes several acres of tidal mudflats on the LDW side. The shorelines are armored with riprap. In this area, the LDW is a tidally-controlled marine embayment with a freshwater lens of outgoing river water on top of the denser marine water. The sediments have salinities consistent with the marine waters from Elliott Bay.

Tides influence water levels at the site in both the Shallow and Deep Aquifers. The response of water levels in the Shallow Aquifer to tidal cycles is evident in monitoring well DM-8, located outside the barrier wall, whereas water levels in monitoring wells located inside the barrier wall remain relatively constant. The water levels measured in DM-8 reflect the water levels in the LDW offshore of the Facility, even though the changes in water level in the well are not as large as those seen in the LDW.

Although the vertical gradients between the Shallow and Deep Aquifers are variable, the overall vertical gradients tend to be upwards. The groundwater elevations measured in the Deep Aquifer are typically 2 to 9 feet higher than the water levels in the Shallow Aquifer.

Before construction of the barrier wall, groundwater flowed across the site from east to west and discharged into the LDW through the sediments and seeps in the subtidal areas, with some groundwater discharging into Slip 6. The presence of the barrier wall now diverts the groundwater flow around the wall. The northern flow eventually enters the LDW while the southern flow enters Slip 6. Groundwater on the LDW side of the barrier wall is dominated by water level fluctuations in the LDW but is expected to be largely stagnant due to the barrier wall.

Site Investigations and Conclusions

Releases of hazardous waste and hazardous constituents have occurred at and from the Facility and are documented in the Order, the RCRA Facility Assessment (1990), and the RCRA Facility Investigation (1995). Recorded spills and materials disposed onto the ground between at least 1952 and 1980 included toluene, vanillin black liquor, autoclave solids, sulfite waste liquor, caustic soda, spent mineral oil containing phenolic compounds, compressor oil, lubricating oils, solvents, and copper-containing metals sludge used for weed control. At least 10 accidental spills and discharges to the LDW were documented between 1975 and 1989 as a result of loading/unloading of raw materials, byproducts, and waste liquids to and from barges, tank rail cars, and tank trucks. These spills involved contaminated surface and process waters, a paper sizing agent called Mersize, vanillin black liquor, sulfite waste liquor, and sodium hydroxide solution. Spills on the property may have migrated through soils and plant drainage systems to river outfalls, groundwater, seeps, and sediments.

Monitoring and sampling investigations have documented the presence of hazardous constituents in the soils, groundwater, sediments, and pore water at the Facility. In addition to quarterly groundwater monitoring, investigations of the West Parcel include the following:

- 1986 – Site Screening Investigation, Dames and Moore
- 1990 – RCRA Facility Assessment, PRC Environmental for EPA
- 1991 – Site Assessment, Landau Associates
- 1995 – Final RCRA Facility Investigation Report, CH2M Hill
- 1996 – Round 3 Data and Sewer Sediment Technical Memorandum, RCRA Facility Investigation
- 1998 – Interim Measures Report, PCB Remediation & Sewer Cleaning, Rhodia, Inc.
- 2000 – Round 6 Groundwater Monitoring, AGI
- 2001 – Geoprobe Investigation Report, AGI
- 2006 – Revised Pre-Demolition Investigation Report, Geomatrix Consultants
- 2006 – Voluntary Interim Measure Report, Hazardous Waste Storage Area and Transformer A Area Cleanup, Geomatrix Consultants
- 2007 – West Parcel Redevelopment Report, Geomatrix Consultants
- 2007 – Northwest Corner Affected Soil Removal Report, Geomatrix Consultants
- 2012 – Sediment Characterization Data Report, AMEC Environment & Infrastructure, Inc.
- 2012 – Shoreline Soil and Groundwater Characterization Data Report, AMEC Environment & Infrastructure, Inc.

The primary hazardous constituents known to be present at the Facility include toluene, copper, and elevated pH due to release of caustic materials. Additional contaminants include PCBs, polycyclic aromatic hydrocarbons, semivolatile organic compounds, and several metals. A complete list of hazardous constituents and their maximum concentrations detected in soil, groundwater, and sediments at the Facility is provided in Attachment 1.

These hazardous constituents are present throughout the soil and groundwater at the Facility, including within and outside the barrier wall. Groundwater monitoring conducted at the Facility confirms that a number of metals and organic contaminants have discharged from the groundwater to the LDW and sediments. Sediments contaminated with PCBs, benzyl alcohol, and other constituents were shown to be present in historic sewers which discharged to the LDW. Sampling in 2012 confirmed that site-related contaminants of concern (COCs) at levels which exceed their respective PRGs are found in the pore water and sediments adjacent to the Facility.

Basis for PRGs

The EPA's policy is that "current and reasonable expected future land use and corresponding exposure scenarios should be considered in both the selection and timing of remedial actions" (61 Federal Register 19452, May 1, 1996). Specifically, the EPA expects to remediate contaminated soils and sediments as necessary to prevent or limit direct exposure of humans and environmental receptors and prevent the transfer of unacceptable concentrations of contaminants (e.g., via leaching, runoff, or airborne emissions) from soils, including subsoils, to any media. The EPA also expects to return usable groundwater to its maximum beneficial use wherever practicable, within a time frame that is reasonable given the particular circumstances of the site. Highest beneficial use of groundwater is generally considered to be potable water (i.e., drinking water). Where groundwater is determined to be non-potable, an alternative highest beneficial use (e.g., protection of surface water) must be evaluated. When restoration of groundwater is not practicable, the EPA expects to prevent or minimize further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction. The EPA also expects to control or eliminate surface and subsurface sources of groundwater contamination.

The EPA considered the following factors in developing these PRGs:

- The Facility is located in an industrial area along the LDW and includes contaminated soil, groundwater, pore water, and sediment. The Facility and immediate surroundings are zoned Manufacturing/Industrial.
- Tribes have fished from the Duwamish River for centuries and have Treaty-guaranteed fishing rights. Northwest tribal populations are known to consume locally harvested fish and shellfish at a higher rate than the general United States population.
- Commercial and recreational fishing occurs in the LDW.
- Recreational activities in the LDW include kayaking, canoeing, and motor boating.
- The LDW is not designated as a potential drinking-water source. Numerical surface water standards for protection of human health are based on consumption of fish and shellfish, and do not include drinking surface water.
- Salmon, ospreys, otters, and other wildlife live in, along, or migrate through the LDW. Ecological receptors include benthic organisms, fish, birds, and mammals. Potential exposure pathways for benthic organisms include direct contact with contaminated sediment and ingestion of contaminated sediment. The primary potential exposure pathway for fish, birds, and mammals is ingestion of other marine organisms and sediment particles. Bottomfish may have additional exposure due to direct contact with or ingestion of contaminated sediment. Risks to benthic organisms, fish, birds, and mammals from exposure to contaminated sediment, surface water, and prey will be reduced by reducing soil, water, and sediment contaminant concentrations.
- As the LDW has a thin freshwater lens of outgoing river water on top of the denser marine waters, both marine and freshwater aquatic standards were considered.
- There are currently no drinking water wells at the Facility and none are expected to be installed in the future, but there have been no determinations per the EPA’s or the State of Washington’s criteria to demonstrate that the groundwater is non-potable.
- Groundwater outside the barrier wall discharges to the surface waters and sediments of the LDW through seeps and pore water.
- Groundwater enclosed within the barrier wall could discharge to the surface waters and sediments of the LDW through seeps and pore water should the wall leak or be breached.
- Human and ecological exposures could occur to soils located between the security fence and the LDW.

- While most of the West Parcel is currently surrounded by a security fence and covered by asphalt pavement, workers could be exposed to contaminants in the soil while conducting trenching or other subsurface work.
- Surface soils outside the barrier wall can contribute contamination to the sediments or directly to the water column through surficial erosion or slumping.
- The site does not currently include any enclosed structures such as office buildings with a potential for exposure due to vapor intrusion from contaminated groundwater or soil.
- The LDW shoreline may be converted to habitat uses.

The spreadsheets in Attachment 2 present the PRGs for those constituents which have been detected in soil, groundwater, and sediments at the Facility. These PRGs will be used to refine the COCs to be evaluated in the upcoming Corrective Measures Study (CMS). Actual cleanup levels and points of compliance will be determined during the CMS process. It is possible that COCs may be added or removed for specific areas or throughout the facility as will be further determined in the CMS. In this document, the EPA has made an overall effort to develop PRGs that are consistent with the LDW Superfund cleanup and with EPA risk assessment and RCRA guidance and policy.

Preliminary Remediation Goals for Groundwater

Groundwater PRGs are presented for two scenarios: where groundwater is considered potentially potable for future drinking water purposes; and where protection of surface water (in this case, from groundwater discharge) is considered the highest beneficial use. Best professional judgment will be required for determining which of the two scenarios predominates from one area to another within the Facility. Generally, the PRGs for potable groundwater apply throughout the Facility and plume, and the PRGs for groundwater to protect surface water apply along the network of monitoring wells along Slip 6 and the LDW.

<u>Groundwater to Protect Drinking Water</u>

Groundwater PRGs must be protective of potential future use of the groundwater itself, i.e., for drinking water or industrial uses. PRGs for potable groundwater apply throughout the Facility and plume.

According to EPA policy as stated in "Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy" (EPA 1988), all groundwaters are presumed to meet both the yield and quality criteria for a current or potential source of drinking water (Class II) unless a successful Class III demonstration is performed. Class III groundwater is determined to not be a potential source of drinking water or has limited beneficial use following the criteria in the guidelines. In addition, potability may be determined empirically using criteria in Washington Administrative Code (WAC) 173-340-720(2). There have been no determinations using the federal or state criteria to demonstrate that the groundwater is Class III or non-potable. Therefore, drinking water at the Facility is assumed to be the highest beneficial use of groundwater, and the drinking water criteria listed below have been included in the PRGs for this Facility.

The following water quality criteria were used to develop the PRGs for groundwater to protect drinking water:

- Federal Maximum Contaminant Levels.
- EPA Regional Screening Levels for tap water, updated May 2020.

<u>Groundwater to Protect Surface Water</u>

Although surface water is not a contaminated medium at the Facility, PRGs must be protective of surface water concentrations that are protective of human health and aquatic species. Groundwater PRGs for protection of surface water must be met at the monitoring well network located along the LDW and Slip 6.

The PRGs for three metals (arsenic, copper, and manganese) are values of "LDW background." These metals occur naturally at levels which exceed the risk-based PRGs. These background levels are based on data that were approved by the EPA in 2006 for use along the LDW (Environmental Partners, Inc., 2006), developed in relation to the nearby Boeing Plant 2 RCRA corrective action facility.

The high pH of groundwater at this facility was taken into consideration as water hardness in calculating certain inorganic PRGs for groundwater discharging to surface water. See the Notes spreadsheet in Attachment 2 for more information.

The following surface water quality criteria protective of aquatic species were used to develop the PRGs for groundwater to protect surface water:

- EPA National Recommended Water Quality Criteria (aka Ambient Water Quality Criteria – AWQC) for protection of aquatic life in surface water per Section 304(a) of the Clean Water Act (CWA), updated in 2015 and 2016.

- Washington (WA) State Department of Ecology Water Quality Criteria applicable to surface waters in the State of WA for protection of aquatic life, WAC 173-201A, updated in 2016.

The following surface water quality criteria protective of human health consumption of organisms were used to develop the PRGs for groundwater to protect surface water:

- EPA National Recommended Water Quality Criteria (aka Ambient Water Quality Criteria - AWQC) for protection of human health (organism only) in surface water, Section 304(a) of the Clean Water Act (CWA), updated in 2015 and 2016.

- WA State Department of Ecology Water Quality Criteria applicable to surface waters in the State of WA for protection of human health (organism only), WAC 173-201A, updated in 2016.

- Tribal Fish and Shellfish Consumption per EPA Region 10's "Framework for Selecting and Using Tribal Fish and Shellfish Consumption Rates for Risk-Based Decision Making at CERCLA and RCRA Cleanup Sites in Puget Sound and the Strait of Georgia."

Tribal Fish and Shellfish Consumption

Surface water PRGs protective of human health based on consumption of fish and shellfish were calculated on a chemical-specific basis consistent with EPA risk assessment standard practice and guidance. The calculations are based on exposure assumptions for Tribal and Asian and Pacific Islander populations which consume higher rates of fish from the LDW than the general population. The calculated values, equations, and inputs for the calculations are presented in Attachment 2.

One exposure assumption in the equations is consumption rates for fish and shellfish. In 2007, the EPA published the document "Framework for Selecting and Using Tribal Fish and Shellfish Consumption Rates for Risk-Based Decision Making at CERCLA and RCRA Cleanup Sites in Puget Sound and the Strait of Georgia." The Framework provides a recommended approach to selecting tribal fish and shellfish consumption rates for purposes of estimating site-related risks and calculating site-specific cleanup levels at EPA hazardous waste cleanup sites.

These PRGs are calculated based on the Tulalip Tribes' consumption rate adjusted for resident fish and shellfish only. Using the Framework, this decision was based upon the following assumptions:

- The Tulalip Tribes' consumption rate is likely to be more appropriate for the LDW area than the Suquamish Tribe's higher rate, because the LDW is unlikely to have sufficient intertidal shellfish habitat to sustain the higher rate of shellfish consumption of the Suquamish Tribe.
- All fish and shellfish harvested from outside Puget Sound are assumed to not be contaminated by releases from the Facility.
- The chemicals present in the tissues of adult salmon in the LDW are assumed to result largely from exposures at remote locations in Puget Sound or the open ocean.

The total fish and shellfish consumption rate for the Tulalip Tribes, based on a 95th percentile consumer-only consumption rate for benthic fish, pelagic fish, shellfish and salmon is 243 g/day. Assuming consumption of resident-only fish and shellfish, the effective consumption rate used for the former Rhone-Poulenc Facility is 98 g/day. The tribal exposure duration is assumed to be 70 years to account for a lifetime of eating fish and shellfish from a specific harvesting area. The average body weight of the adult participants in the study, 81.8 kg, is also used. The consumption rate for children is estimated to be 39 g/day, which is 40 percent of the adult rate. EPA risk assessment practice calls for exposure to be time-weighted for different life phases, and the resulting risk from both childhood and adult exposure periods be averaged over a 70-year presumed lifetime.

Also accounted for are the seafood consumption rates of Asian and Pacific Islanders who harvest from the LDW and Elliott Bay and may be exposed to chemical releases from the Facility. The EPA funded and participated in a study (EPA, 1999) to estimate the amount and types of seafood consumed by the Asian and Pacific Islander population in King County. The 95th percentile total seafood Asian and Pacific Islander consumption rate is 305.7 g/day. The seafood harvested and consumed by Asian and Pacific Islanders only from King County waters was estimated and assumed to be the amount of seafood potentially affected by the Facility releases. This amount, for adults, is 51.5 g/day, extrapolated to a child rate of 21 g/day based on 40 percent of the adult rate. The average adult study participant body weight of 63 kg was used. As the EPA had no information regarding exposure duration based on consistency in harvesting from certain areas over a lifetime, the standard exposure duration of 30 years was used for this population.

The EPA determined that the calculations result in more protective surface water concentrations when the tribal fish consumption numbers are used relative to the Asian and Pacific Islanders' consumption numbers. The tribal results are therefore considered protective for both populations.

<u>Groundwater to Protect Sediment</u>

The PRGs consider the partitioning of groundwater contamination to sediment. Like the Groundwater to Protect Surface Water scenario, groundwater PRGs for protection of sediment must be met at the monitoring well network located along the LDW and Slip 6. These groundwater PRGs include values from:

- Ecology's Lower Duwamish Waterway Preliminary Cleanup Level (PCUL) Workbook and Supplemental Information, dated December 2020.

The values in the LDW PCUL document were developed consistent with the cleanup levels in the LDW ROD. These groundwater-to-protect-sediment values are relevant to the Facility because of the environmental transport pathways to sediment in the LDW. Specifically, PCUL number GW-3 applies as the protection of sediment via groundwater transport pathway.

Preliminary Remediation Goals for Soil

<u>Direct Exposure to Soil</u>

The PRGs for soil apply throughout the vadose zone (approximately the upper 11 feet below ground surface). The PRGs address ingestion, inhalation, and dermal absorption for residential and industrial exposures. Also presented are values for protection of sediment and groundwater. If a corrective measure can achieve the PRGs provided for unrestricted use, restrictions on use of the property will not be needed. If a corrective measure cannot achieve the unrestricted use PRGs but can achieve the PRGs for restricted use, institutional or controls to restrict future uses of the property as appropriate will be required.

PRGs for direct contact with soils, including ingestion, dermal, and inhalation of dust, were developed from the following source:

- EPA Regional Screening Levels for residential soil and composite worker soil (cancer risk = 1E-6, HQ = 1), updated May 2020.

Puget Sound Background

Several soil background values for metals in soil in Puget Sound were obtained from Ecology's October 1994 publication, "Natural Background Soil Metals Concentrations in Washington State."

Shoreline Soils to Protect Sediment

The PRGs for shoreline soils apply throughout the vadose zone (approximately the upper 11 feet below ground surface) from the barrier wall to the tideflats. In addition to being protective for direct contact, the soils along the shoreline must be protective of the sediment from contamination caused by erosion and sloughing of contaminated bank soils directly to the sediment. Therefore, the soil PRGs at the shoreline include values from:

- EPA Regional Screening Levels for residential soil and composite worker soil (cancer risk = 1E-6, HQ = 1), updated May 2020.

- Ecology's Lower Duwamish Waterway Preliminary Cleanup Level (PCUL) Workbook and Supplemental Information, dated December 2020.

The values in the LDW PCUL document were developed consistent with the cleanup levels in the LDW ROD. These shoreline soils to protect sediment values apply to the Facility because of the environmental transport pathways from the upland portion of the Facility to sediment in the LDW. Specifically, PCUL number SL-8 applies as the protection of sediment via bank erosion transport pathway.

Soil to Protect Groundwater

A potential exposure pathway also exists in areas of contaminated soils for contaminants to leach from soil into the groundwater. Target cleanup concentrations of site-related contaminants in subsurface soils that are protective of groundwater must be considered based on specific conditions in the area of contamination. For example, these values would not apply to an area of contaminated soil if groundwater beneath or in contact with it is not impacted by that soil contaminant.

Soil concentrations that would be protective of groundwater directly beneath any soil contamination are presented in the soils PRG spreadsheet. No attempt has been made to attenuate contamination with groundwater migration or to account for the location of the shoreline relative to the location of the soil contamination. The soil to protect groundwater values were obtained from:

- EPA's Regional Screening Levels Residential Soil to Groundwater, updated May 2020.

Vapor Intrusion

Attachment 2 includes a spreadsheet of key outputs from EPA's Vapor Intrusion Screening Level Calculator for chemicals previously detected in soil, groundwater, and sediment at the former

Rhone-Poulenc Facility. Only those chemicals available in the calculator and demonstrated to be "sufficiently volatile and toxic to pose inhalation risk via vapor intrusion" from soil or groundwater sources per the calculator output were retained in this spreadsheet.

These outputs are for future consideration for vapor intrusion from soil gas or groundwater to indoor air in buildings that may be constructed in the future. These values are for use in making decisions regarding the potential need for additional studies to establish engineering or institutional controls if buildings are constructed at the Facility. Concentrations of site-related contaminants in subsurface media that are protective of indoor air concentrations must be determined or estimated based on building-specific and subsurface-specific conditions and may change as subsurface contaminant concentrations change over time.

Preliminary Remediation Goals for Sediments

Contamination in the LDW is being cleaned up under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 U.S.C. 9601 et seq. as amended). In November 2014 the EPA published the *Record of Decision, Lower Duwamish Waterway Superfund Site*, which presents the EPA's selected remedy for in-waterway cleanup in the LDW. The ROD includes an analysis of the human health and environmental risks posed by contaminants located in the LDW sediments.

The Facility includes an area of privately-owned tideflats. Contamination found on the Facility's property is subject to the requirements of the Order which requires cleanup of contaminants released or migrated from the Facility. However, the contaminants found in the tideflats and in-waterway sediments are not unique to this Facility. For this reason, cleanup of the privately-owned tideflats is being required under the Order, and any contribution the Facility may have made to the rest of the LDW will be managed through CERCLA.

The Facility's privately-owned tideflats contain contaminants that have been detected in the soil and groundwater at the Facility and therefore are known to be site-related contaminants. Sediment PRGs for protection of human health and the environment for PCBs, SVOCs, metals, and other contaminants detected at the Facility are presented in Attachment 2. These PRGs are from the LDW ROD Tables 19 and 20; and WAC 173-204-562, Table III, Marine Sediment, Sediment Cleanup Objectives and Cleanup Screening Levels Chemical Criteria.

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Attachment 2

Hazardous Constituents Detected in Soil, Groundwater, and Sediments

- Table 1: Summary of Constituents Detected in Groundwater and Soil
- Table 2: Summary of Constituents Detected in Sediment
- Table 3: Sediment Characterization Data Report, 2012
- Table 4: Shoreline Soil and Groundwater Characterization Data Report, 2012
- Table 5: Northwest Corner Affected Soil Removal Report, 2007
- Table 6: Voluntary Interim Measure Report Hazardous Waste Storage Area and Transformer A Area Cleanup, 2006
- Table 7: Revised Pre-Demolition Investigation Report, 2006
- Table 8: Round 6 Groundwater Monitoring, 2000
- Table 9: Interim Measures Report, PCB Remediation & Sewer Cleaning, 1998
- Table 10: RCRA Facility Investigation, Round 3 Data and Sewer Sediment Technical Memorandum, 1996
- Table 11: RCRA Facility Investigation (RFI) Report, 1995

Table 1
Summary of Constituents Detected in Groundwater and Soil
Rhone-Poulenc, Inc., Marginal Way Facility, West Parcel

Constituent	Maximum Groundwater Concentration			Maximum Soil Concentration		
		Units	Reference		Units	Reference
Aluminum	880,000	µg/L	AMEC 2012	19,700	mg/kg	Rhone-Poulenc, 1995
Antimony				21.2	mg/kg	Rhone-Poulenc, 1995
Arsenic	107	µg/L	AMEC 2012	61.4	mg/kg	Rhone-Poulenc, 1995
Barium	63	µg/L	AGI, 2000	169	mg/kg	Geomatrix, 2007
Beryllium				1.10	mg/kg	Rhone-Poulenc, 1995
Cadmium	6.0	µg/L	AMEC 2012	5.0	mg/kg	Rhone-Poulenc, 1995
Calcium				34,400	mg/kg	Rhone-Poulenc, 1995
Chromium	2,590	µg/L	AMEC 2012	64.9	mg/kg	Rhone-Poulenc, 1995
Cobalt				28.7	mg/kg	Rhone-Poulenc, 1995
Copper	1,880	µg/L	AMEC 2012	18,200	mg/kg	Geomatrix, 2007
Iron				50,400	mg/kg	Rhone-Poulenc, 1995
Lead	196	µg/L	AMEC 2012	116	mg/kg	Rhone-Poulenc, 1995
Magnesium				15,100	mg/kg	Rhone-Poulenc, 1995
Manganese				941	mg/kg	Rhone-Poulenc, 1995
Mercury	9.76J	µg/L	AMEC 2012	268	mg/kg	Rhone-Poulenc, 1995
Nickel	610	µg/L	AMEC 2012	65.7	mg/kg	Rhone-Poulenc, 1995
Potassium				902	mg/kg	Rhone-Poulenc, 1995
Selenium				0.8J	mg/kg	Geomatrix, 2007
Silver	0.4	µg/L	AGI, 2000	3.5	mg/kg	Rhone-Poulenc, 1995
Sodium				4,200	mg/kg	Rhone-Poulenc, 1995
Tin	60	µg/L	AGI, 2000			
Vanadium	4,290	µg/L	AMEC 2012	185	mg/kg	Rhone-Poulenc, 1995
Zinc	2,770	µg/L	AMEC 2012	1,990	mg/kg	Rhone-Poulenc, 1995
Acetone	120	µg/L	AMEC 2012	13.0	mg/kg	Rhone-Poulenc, 1995
Benzene	130	µg/L	AGI 2000	0.23	mg/kg	Rhone-Poulenc, 1995
Bromoform				0.002	mg/kg	Rhone-Poulenc, 1995
2-Butanone				1.1	mg/kg	Rhone-Poulenc, 1995
sec-Butylbenzene				0.0008J	mg/kg	AMEC 2012
Carbon disulfide	1.7	µg/L	AMEC 2012	0.038	mg/kg	AMEC 2012
1,4-Dichlorobenzene	0.1J	µg/L	AMEC 2012			
cis-1,2-Dichloroethene	0.4	µg/L	AMEC 2012	0.0025	mg/kg	AMEC 2012
Ethylbenzene	100	µg/L	AGI 2000	6.4	mg/kg	Rhone-Poulenc, 1995
Formaldehyde				3.4	mg/kg	Rhone-Poulenc, 1995
4-Isopropyl toluene	2.2	µg/L	AMEC 2012	0.024	mg/kg	AMEC 2012

Table 1, continued
Summary of Constituents Detected in Groundwater and Soil
Rhone-Poulenc, Inc., Marginal Way Facility, West Parcel

Constituent	Maximum Groundwater Concentration			Maximum Soil Concentration		
		Units	Reference		Units	Reference
Methylene chloride	4.1	µg/L	AMEC 2012	1.6	mg/kg	Rhone-Poulenc, 1995
Tetrachloroethene				0.0017J	mg/kg	AMEC 2012
Toluene	570,000	µg/L	AGI 2000	4,900	mg/kg	Rhone-Poulenc, 1995
Trichloroethene				0.2	mg/kg	Rhone-Poulenc, 1995
1,2,4-Trimethylbenzene	1.1	µg/L	AGI 2000			
1,3,5-Trimethylbenzene	0.2J	µg/L	AMEC 2012			
Xylene (total)	92	µg/L	AGI 2000	13	mg/kg	Rhone-Poulenc, 1995
m,p-Xylene	1.8J	µg/L	AMEC 2012	0.0015	mg/kg	AMEC 2012
o-Xylene	0.9J	µg/L	AMEC 2012			AMEC 2012
Acenaphthene				0.13	mg/kg	Rhone-Poulenc 1995
Acenaphthylene				0.0037	mg/kg	Geomatrix 2007
Anthracene				0.26	mg/kg	Rhone-Poulenc 1995
Benzo[a]anthracene				0.46	mg/kg	Rhone-Poulenc 1995
Total Benzofluoranthenes				0.10	mg/kg	AMEC 2012
Benzo(b)fluoranthene				0.72	mg/kg	Rhone-Poulenc 1995
Benzo(k)fluoranthene				0.59	mg/kg	Rhone-Poulenc 1995
Benzo[ghi]perylene				0.41	mg/kg	Rhone-Poulenc 1995
Benzo(a)pyrene				0.65	mg/kg	Rhone-Poulenc 1995
Benzoic acid				0.098J	mg/kg	AMEC 2012
Benzyl alcohol	17	µg/L	AGI 2000	0.19	mg/kg	Rhone-Poulenc 1995
Bis(2-ethylhexyl)phthalate				6.8	mg/kg	Rhone-Poulenc 1995
Butyl benzyl phthalate				0.023	mg/kg	Geomatrix 2007
Carbazole				0.17	mg/kg	Rhone-Poulenc 1995
Chrysene				0.84	mg/kg	Rhone-Poulenc 1995
Dibenz(a,h)anthracene				0.016J	mg/kg	AMEC 2012
Dibenzofuran				0.12	mg/kg	AMEC 2012
2,4-Dimethylphenol	0.8J	µg/L	AGI 2000	0.29	mg/kg	Rhone-Poulenc 1995
Di-n-butyl phthalate				0.43	mg/kg	Rhone-Poulenc 1995
Fluoranthene				1.8	mg/kg	Rhone-Poulenc 1995
Fluorene				0.15	mg/kg	Rhone-Poulenc 1995
Indeno(1,2,3-cd)pyrene				0.44	mg/kg	Rhone-Poulenc 1995
2-Methylnaphthalene				0.1	mg/kg	Rhone-Poulenc 1995
2-Methylphenol	220E	µg/L	AGI 2000	7.5	mg/kg	Rhone-Poulenc 1995
4-Methylphenol	170E	µg/L	AGI 2000	5.1	mg/kg	Rhone-Poulenc 1995

Table 1, continued
Summary of Constituents Detected in Groundwater and Soil
Rhone-Poulenc, Inc., Marginal Way Facility, West Parcel

Constituent	Maximum Groundwater Concentration			Maximum Soil Concentration		
		Units	Reference		Units	Reference
Naphthalene	0.3MJ	µg/L	AGI 2000	0.29	mg/kg	Rhone-Poulenc 1995
Pentachlorophenol	3.2J	µg/L	AGI 2000	4.9	mg/kg	Rhone-Poulenc 1995
Phenanthrene				1.4	mg/kg	Rhone-Poulenc 1995
Phenol				6.2	mg/kg	Rhone-Poulenc 1995
1,4-Phenylenediamine	12Y	µg/L	AGI 2000			
2-Propanol				10	mg/kg	Rhone-Poulenc 1995
Pyrene				1.5	mg/kg	Rhone-Poulenc 1995
2,4,5-Trichlorophenol				0.0079	mg/kg	Geomatrix 2007
Vanillin				450	mg/kg	Rhone-Poulenc 1995
Total cPAHs				0.106	mg/kg	Geomatrix 2007
Alpha chlordane				.018	mg/kg	Rhone-Poulenc 1995
4,4'-DDD				0.2	mg/kg	Rhone-Poulenc 1995
4,4'-DDE				0.62	mg/kg	Rhone-Poulenc 1995
4,4'-DDT				2.6	mg/kg	Rhone-Poulenc 1995
Dieldrin				0.0095	mg/kg	Rhone-Poulenc 1995
Endosulfan I				0.0065	mg/kg	Rhone-Poulenc 1995
Endosulfan II				0.024	mg/kg	Rhone-Poulenc 1995
Endosulfan sulfate				0.0096	mg/kg	Rhone-Poulenc 1995
Endrin				0.022	mg/kg	Rhone-Poulenc 1995
Endrin aldehyde				0.11	mg/kg	Rhone-Poulenc 1995
Endrin ketone				0.019	mg/kg	Rhone-Poulenc 1995
Gamma-chlordane				0.026	mg/kg	Rhone-Poulenc 1995
Methoxychlor				0.04	mg/kg	Rhone-Poulenc 1995
PCBs (Arochlor 1254)				1,588.71	mg/kg	Rhodia 1998
TPH-DRO				2,100	mg/kg	Geomatrix 2007
TPH-GRO				13,000	mg/kg	Geomatrix 2007
TPH-RRO				470	mg/kg	Geomatrix 2007

Table 2
Summary of Constituents Detected in Sediment
Rhone-Poulenc, Inc., Marginal Way Facility, West Parcel

Constituent	AMEC 2012 Sampling		Rhone-Poulenc 1995 Sampling	
	Maximum Concentration	Units	Maximum Concentration	Units
Aluminum			22,600	mg/kg
Arsenic	28.9	mg/kg	9.9	mg/kg
Barium			56.1	mg/kg
Beryllium			0.81	mg/kg
Cadmium	2.9	mg/kg	0.4	mg/kg
Calcium			5,700	mg/kg
Chromium	38.9	mg/kg	25.0	mg/kg
Cobalt			13.9	mg/kg
Copper	330	mg/kg	57.4	mg/kg
Iron			25,400	mg/kg
Lead	52	mg/kg	26.0	mg/kg
Magnesium			6,450	mg/kg
Manganese			320.0	mg/kg
Mercury	0.5	mg/kg	0.09	mg/kg
Nickel			23.4	mg/kg
Silver	0.9	mg/kg	0.19	mg/kg
Sodium			3,940	mg/kg
Vanadium	83.9	mg/kg	71.2	mg/kg
Zinc	134	mg/kg	92.5	mg/kg
Total LPAH	192.58	mg/kg carbon		
Naphthalene	104.80	mg/kg carbon		
Acenapthylene	7.58	mg/kg carbon		
Acenaphthene	29.69	mg/kg carbon		
Fluorene	22.62	mg/kg carbon	15.0	µg/kg
Phenathrene	56.39	mg/kg carbon	470.0	µg/kg
Anthracene	91.27	mg/kg carbon	26.0	µg/kg
2-Methylnaphthalene	21	mg/kg carbon	17.0	µg/kg
Total HPAH	607.20	mg/kg carbon		
Fluoranthene	232.80	mg/kg carbon	1,200	µg/kg
Pyrene	190.48	mg/kg carbon	890.0	µg/kg
Benzo(a)anthracene	21.03	mg/kg carbon	220.0	µg/kg
Chrysene	68.78	mg/kg carbon	410.0	µg/kg
Benzo(b)fluoranthene			240.0	µg/kg
Benzo(k)fluoranthene			250.0	µg/kg

Table 2, continued
Summary of Constituents Detected in Sediment
Rhone-Poulenc, Inc., Marginal Way Facility, West Parcel

Constituent	AMEC 2012 Sampling		Rhone-Poulenc 1995 Sampling	
	Maximum Concentration	Units	Maximum Concentration	Units
Total Benzofluoranthenes	63.49	mg/kg carbon		
Benzo(a)pyrene	21.43	mg/kg carbon	170.0	µg/kg
Indeno(1,2,3-cd)pyrene	11.11	mg/kg carbon	120.0	µg/kg
Dibenz(a,h)anthracene	4.44	mg/kg carbon	26.0	µg/kg
Benzo(g,h,i)perylene	11.9	mg/kg carbon	91.0	µg/kg
1,2-Dichlorobenzene	0.18J	mg/kg carbon		
1,4-Dichlorobenzene	2.6J	mg/kg carbon		
1,2,4-Trichlorobenzene	0.26	mg/kg carbon		
Hexachlorobenzene	0.16	mg/kg carbon		
Dimethyl phthalate	1.35	mg/kg carbon	19.0	µg/kg
Diethyl phthalate	6.73	mg/kg carbon		
Di-n-Butyl phthalate	1.15	mg/kg carbon	13.0	µg/kg
Butyl benzyl phthalate	1.30	mg/kg carbon	23.0	µg/kg
bis(2-Ethylhexyl) phthalate	6.35	mg/kg carbon	710.0	µg/kg
Di-n-octyl phthalate	9.41	mg/kg carbon	140.0	µg/kg
Dibenzofuran	11.97	mg/kg carbon		
N-Nitrosodiphenylamine	0.27	mg/kg carbon		
Phenol	110	mg/kg carbon	130.0	µg/kg
2-Methylphenol	14	mg/kg carbon		
4-Methylphenol	230	mg/kg carbon	22.0	µg/kg
2,4-Dimethylphenol	21	mg/kg carbon		
Pentachlorophenol	19J	mg/kg carbon		
Benzyl alcohol	110	mg/kg carbon		
Benzoic acid	380	mg/kg carbon		
Aroclor 1254	84.34	mg/kg carbon	210.0	µg/kg
Aroclor 1260	15.66	mg/kg carbon	50.0	µg/kg
Aldrin			2.3	µg/kg
Alpha-chlordane			1.3	µg/kg
BHC-delta			11.0	µg/kg
4,4'-DDD			160.0	µg/kg
4,4'-DDE			45.0	µg/kg
4,4'-DDT			180.0	µg/kg
Dieldrin			3.3	µg/kg
Endosulfan I			1.3	µg/kg
Endosulfan II			2.8	µg/kg
Endosulfan sulfate			9.4	µg/kg

Table 2, continued
Summary of Constituents Detected in Sediment
Rhone-Poulenc, Inc., Marginal Way Facility, West Parcel

Constituent	AMEC 2012 Sampling		Rhone-Poulenc 1995 Sampling	
	Maximum Concentration	Units	Maximum Concentration	Units
Endrin aldehyde			5.1	µg/kg
Endrin ketone			5.1	µg/kg
Gamma-chlordane			4.4	µg/kg
Methoxychlor			12.0	µg/kg

Table 3
Sediment Characterization Data Report
AMEC Environment & Infrastructure, Inc.
April 19, 2012

Constituent	Surface Sediment Concentration		Subsurface Sediment Concentration		
	Maximum Concentration	Sample Location	Maximum Concentration	Sample Location	Units
Arsenic	13	RP-20	28.9	RP-16-0020	mg/kg dry weight
Cadmium	0.8	RP-20	2.9	RP-08-0040	mg/kg dry weight
Chromium	32	RP-20	38.9	RP-16-0020	mg/kg dry weight
Copper	62.4	RP-01	330	RP-08-0020	mg/kg dry weight
Lead	23	RP-11	52	RP-23-0120	mg/kg dry weight
Mercury	0.16	RP-17	0.5	RP-05-0020	mg/kg dry weight
Silver			0.9	RP-23-0080	mg/kg dry weight
Vanadium	78.3	RP-20	83.9	RP-20-0040	mg/kg dry weight
Zinc	107	RP-20	134	RP-23-0120	mg/kg dry weight
Total LPAH	167.9	RP-01	192.58	RP-23-0080	mg/kg carbon
Naphthalene	1.81	RP-24	104.80	RP-23-0080	mg/kg carbon
Acenapthylene	1.39	RP-12	7.58	RP-26-0020	mg/kg carbon
Acenaphthene	5.49	RP-06	29.69	RP-23-0080	mg/kg carbon
Fluorene	22.62	RP-01	14.41	RP-23-0080	mg/kg carbon
Phenathrene	56.39	RP-12	40	RP-18-0020	mg/kg carbon
Anthracene	91.27	RP-01	40.48	RP-23-0080	mg/kg carbon
2-Methylnaphthalene	7.66	RP-16	21	RP-09-0040	mg/kg carbon
Total HPAH	264.68	RP-01	607.20	RP-23-0020	mg/kg carbon
Fluoranthene	52.63	RP-12	232.80	RP-23-0020	mg/kg carbon
Pyrene	36.90	RP-01	190.48	RP-23-0020	mg/kg carbon
Benzo(a)anthracene	21.03	RP-01	15.87	RP-23-0020	mg/kg carbon
Chrysene	67.46	RP-01	68.78	RP-23-0020	mg/kg carbon
Total Benzofluoranthenes	51.59	RP-01	63.49	RP-23-0020	mg/kg carbon
Benzo(a)pyrene	21.43	RP-01	15.87	RP-23-0020	mg/kg carbon
Indeno(1,2,3-cd)pyrene	11.11	RP-01	8.47	RP-23-0020	mg/kg carbon
Dibenz(a,h)anthracene	4.44	RP-06	3.46	RP-24-0040	mg/kg carbon
Benzo(g,h,i)perylene	11.9	RP-01	8.47	RP-23-0020	mg/kg carbon
1,2-Dichlorobenzene	0.1J	RP-10	0.18J	RP-24-0040	mg/kg carbon
1,4-Dichlorobenzene	0.20	RP-10	2.6J	RP-13-0040	mg/kg carbon
1,2,4-Trichlorobenzene	0.26	RP-01			mg/kg carbon
Hexachlorobenzene	0.16	RP-11			mg/kg carbon

Table 3, continued
Sediment Characterization Data Report
AMEC Environment & Infrastructure, Inc.
April 19, 2012

Constituent	Surface Sediment Concentration		Subsurface Sediment Concentration		
	Maximum Concentration	Sample Location	Maximum Concentration	Sample Location	Units
Dimethyl phthalate	1.35	RP-01	0.39	RP-25-0040	mg/kg carbon
Diethyl phthalate	1.51J	RP-19	6.73	RP-06-0020	mg/kg carbon
Di-n-Butyl phthalate			1.15	RP-02-0020	mg/kg carbon
Butyl benzyl phthalate	1.25	RP-03	1.30	RP-24-0040	mg/kg carbon
bis(2-Ethylhexyl) phthalate	6.35	RP-01	4.26	RP-23-0120	mg/kg carbon
Di-n-octyl phthalate	3.37	RP-01	9.41	RP-19-0040	mg/kg carbon
Dibenzofuran	6.35	RP-01	11.97	RP-23-0080	mg/kg carbon
N-Nitrosodiphenylamine	0.27	RP-10			mg/kg carbon
Aroclor 1254	28.16	RP-10	84.34	RP-05-0020	mg/kg carbon
Aroclor 1260	9.77	RP-10	15.66	RP-05-0020	mg/kg carbon
Phenol	43	RP-13	110	RP-07-0020	mg/kg carbon
2-Methylphenol	3.4J	RP-10	14	RP-12-0040	mg/kg carbon
4-Methylphenol	62	RP-13	230	RP-08-0020	mg/kg carbon
2,4-Dimethylphenol	3.6J	RP-10	21	RP-26-0020	mg/kg carbon
Pentachlorophenol	15J	RP-05	19J	RP-06-0040	mg/kg carbon
Benzyl alcohol	110	RP-17	110	RP-16-0020	mg/kg carbon
Benzoic acid	230J	RP-20	380	RP-23-0020	mg/kg carbon

Table 4
Shoreline Soil and Groundwater Characterization Data Report
AMEC Environment & Infrastructure, Inc.
March 12, 2012

Constituent	Groundwater Concentration			Soil Concentration		
	Maximum Concentration	Sample Location	Units	Maximum Concentration	Sample Location	Units
Aluminum	880,000	SL-14, 51 ft	µg/L	17,800	SL-15, 20 ft	mg/kg
Arsenic	107	SL-15, 16 ft	µg/L	29.4J	SL-14, 15 ft	mg/kg
Cadmium	6	SL-15, 16 ft	µg/L	0.6	SL-14, 15 ft	mg/kg
Chromium	2,590	SL-14, 46 ft	µg/L	30	SL-07, 0.5 ft	mg/kg
Copper	1,880	SL-15, 16 ft	µg/L	2,180J	SL-01, 0.5 ft	mg/kg
Lead	196	SL-10, 51 ft	µg/L	22	SL-14, 15 ft	mg/kg
Mercury	9.76J	SL-15, 16 ft	µg/L	83	SL-08, 0.5 ft	mg/kg
Nickel	610	SL-10, 51 ft	µg/L	40	SL-07, 0.5 ft	mg/kg
Vanadium	4,290	SL-14, 46 ft	µg/L	66.3	SL-15, 20 ft	mg/kg
Zinc	2,770	SL-14, 46 ft	µg/L	120	SL-13, 0.5 ft	mg/kg
Acenaphthene				28	SL-01, 5 ft	µg/kg
Anthracene				13J	SL-01, 10 ft	µg/kg
Benzo(a)anthracene				28J	SL-01, 0.5 ft	µg/kg
Benzo(a)pyrene				38	SL-01, 0.5 ft	µg/kg
Benzo(g,h,i)perylene				45	SL-01, 0.5 ft	µg/kg
Benzoic acid				98J	SL-01, 10 ft	µg/kg
Chrysene				42	SL-01, 0.5 ft	µg/kg
Dibenz(a,h)anthracene				16J	SL-01, 0.5 ft	µg/kg
Dibenzofuran				120	SL-04, 0.5 ft	µg/kg
Fluoranthene				55	SL-03, 0.5 ft	µg/kg
Fluorene				19	SL-01, 10 ft	µg/kg
Indeno(1,2,3-cd)pyrene				42	SL-01, 0.5 ft	µg/kg
Naphthalene				110	SL-01, 5 ft	µg/kg
Pentachlorophenol				210	SL-01, 0.5 ft	µg/kg
Phenathrene				110	SL-04, 0.5 ft	µg/kg
Phenol				150	SL-04, 5 ft	µg/kg
Pyrene				42	SL-01, 0.5 ft	µg/kg
Total benzofluoranthenes				100	SL-01, 0.5 ft	µg/kg
Total cPAHs				57.02	SL-01, 0.5 ft	µg/kg

Table 4, continued
Shoreline Soil and Groundwater Characterization Data Report
AMEC Environment & Infrastructure, Inc.
March 12, 2012

Constituent	Groundwater Concentration			Soil Concentration		
	Maximum Concentration	Sample Location	Units	Maximum Concentration	Sample Location	Units
1,2,4-Trimethylbenzene	0.9J	SL-09, 30 ft	µg/L			
1,3,5-Trimethylbenzene	0.2J	SL-09, 30 ft	µg/L			
1,4-Dichlorobenzene	0.1J	SL-10, 36 ft	µg/L			
2-Butanone				36	SL-12, 50 ft	µg/kg
4-Isopropyltoluene	2.2	SL-12, 41 ft	µg/L	24	SL-14, 15 ft	µg/kg
Acetone	120	SL-12, 41 ft	µg/L	190	SL-12, 50 ft	µg/kg
Benzene	1.3	SL-12, 41 ft	µg/L	28	SL-02, 10 ft	µg/kg
Carbon Disulfide	1.7	SL-14, 46 ft	µg/L	38	SL-12, 35 ft	µg/kg
cis-1,2-dichloroethene	0.4	SL-14, 21 ft	µg/L	2.5	SL-14, 15 ft	µg/kg
m,p-Xylene	1.8J	SL-09, 30 ft	µg/L	1.5	SL-01, 5 ft	µg/kg
Methylene chloride	4.1	SL-12, 46 ft	µg/L	22	SL-11, 30 ft	µg/kg
o-Xylene	0.9J	SL-09, 30 ft	µg/L			
sec-Butylbenzene				0.8J	SL-01, 5 ft	µg/kg
Tetrachloroethene				1.7J	SL-14, 15 ft	µg/kg
Toluene	440	SL-12, 46 ft	µg/L	970	SL-12, 50 ft	µg/kg
Trichloroethene			µg/L	4	SL-14, 15 ft	µg/kg
Aroclor 1254				5,900	SL-01, 0.5 ft	µg/kg
Aroclor 1260				160	SL-02, 0.5 ft	µg/kg

Table 5
Northwest Corner Affected Soil Removal
Report Geomatrix Consultants
May 23, 2007

Constituent	Soil Concentration			
	Maximum Concentration	Sample Location	Sample Depth feet	Units
Arsenic	4.53	NWC-1-12W	0.5 to 1.0	mg/kg
Barium	169	NWC-2-39W	2.0 to 2.5	mg/kg
Cadmium	0.288	NWC-2-39W	2.0 to 2.5	mg/kg
Chromium	15.1	NWC-1-12W	0.5 to 1.0	mg/kg
Copper	18,200	NWC-2-39W	2.0 to 2.5	mg/kg
Lead	28.2	NWC-2-39W	2.0 to 2.5	mg/kg
Mercury	1.91	NWC-2-39W	2.0 to 2.5	mg/kg
Selenium	0.8J	NWC-1-2W	0.5 to 1.0	mg/kg
Silver	0.219	NWC-1-12W	0.5 to 1.0	mg/kg
Acenaphthylene	3.7	NWC-1-12W	0.5 to 1.0	µg/kg
Anthracene	7.5	NWC-1-12W	0.5 to 1.0	µg/kg
Benzo(a)anthracene	55	NWC-1-12W	0.5 to 1.0	µg/kg
Benzo(a)pyrene	75	NWC-1-12W	0.5 to 1.0	µg/kg
Benzo(b)fluoranthene	97	NWC-1-12W	0.5 to 1.0	µg/kg
Benzo(g,h,i)perylene	68	NWC-1-12W	0.5 to 1.0	µg/kg
Benzo(k)fluoranthene	31	NWC-1-12W	0.5 to 1.0	µg/kg
bis(2-Ethylhexyl) phthalate	34	NWC-1-2W	0.5 to 1.0	µg/kg
Butyl benzyl phthalate	23	NWC-1-12W	0.5 to 1.0	µg/kg
Chrysene	79	NWC-1-12W	0.5 to 1.0	µg/kg
Dibenzo(a,h)anthracene	13	NWC-1-12W	0.5 to 1.0	µg/kg
Dibenzofuran	4.1	NWC-1-12W	0.5 to 1.0	µg/kg
di-n-Butylphthalate	15	NWC-1-22W	1.0 to 1.5	µg/kg
Fluoranthene	97	NWC-1-12W	0.5 to 1.0	µg/kg
Indeno(1,2,3-cd)pyrene	63	NWC-1-12W	0.5 to 1.0	µg/kg
2-Methylnaphthalene	13	NWC-1-22W	1.0 to 1.5	µg/kg
Naphthalene	14	NWC-1-22W	1.0 to 1.5	µg/kg
Pentachlorophenol	550	NWC-1-22W	1.0 to 1.5	µg/kg
Phenathrene	36	NWC-1-12W	0.5 to 1.0	µg/kg
Phenol	17	NWC-1-22W	1.0 to 1.5	µg/kg
Pyrene	95	NWC-1-12W	0.5 to 1.0	µg/kg
2,4,5-Trichlorophenol	7.9	NWC-1-22W	1.0 to 1.5	µg/kg
Total cPAHs	106	NWC-1-12W	0.5 to 1.0	µg/kg
GRO-NWTPH	13,000	NWC-2-6W	2.0 to 3.0	mg/kg
DRO-NWTPH	2,100	NWC-2-36W	3.5 to 4.0	mg/kg
RRO-NWTPH	470	NWC-2-6W	2.0 to 3.0	mg/kg

Table 6
Voluntary Interim Measure Report
Hazardous Waste Storage Area and Transformer A Area Cleanup
Geomatrix Consultants, Inc.
August 18, 2006

Constituent	Catch Basin Water Concentration		Catch Basin Sediment Concentration		Soil Concentration prior to removal action	
	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units
TPH-D	1,100	mg/L	6,800	mg/kg	9,300	mg/kg
TPH-O	150	mg/L	1,200	mg/kg	1,200	mg/kg
Arsenic	0.090	mg/L				
Chromium	0.082	mg/L	14.4	mg/kg	13.3	mg/kg
Copper	6.39	mg/L	110	mg/kg	540	mg/kg
Lead	0.07	mg/L	4	mg/kg	4	mg/kg
Mercury	0.0006	mg/L			0.11	mg/kg
Zinc	0.395	mg/L	35.0	mg/kg	34.6	mg/kg
Phenanthrene			220J	µg/kg	290	µg/kg
Fluoranthene	5.3J	µg/L	350	µg/kg	610	µg/kg
Pyrene	5.5J	µg/L	320	µg/kg	570	µg/kg
Benzo(a)anthracene	3.8J	µg/L			160J	µg/kg
Chrysene	4.1J	µg/L	190J	µg/kg	310	µg/kg
Benzo(b)fluoranthene	3.8J	µg/L			260	µg/kg
Benzo(k)fluoranthene			160J	µg/kg	240J	µg/kg
Indeno(1,2,3-cd)pyrene					160J	µg/kg
Benzo(ghi)perylene					160J	µg/kg
4-Methylphenol	810	µg/L	240J	µg/kg		
2-Methylphenol	5.9J	µg/L				
2,4-Dimethylphenol	3.6J	µg/L				
Benzoic acid	120	µg/L				
Naphthalene	3.0J	µg/L				
2-Methylnaphthalene	10	µg/L				
Phenol	63	µg/L				

Table 7
Revised Pre-Demolition Investigation Report
Geomatrix Consultants, Inc.
May 8, 2006

Constituent	Test Pit 2, Old Meal Bin Soil Sample		Test Pit 7, Old Meal Bin Stairway Soil Sample			
	Maximum Concentration	Units	Maximum Concentration	Units		
Methylene chloride	3.2	µg/kg	5.0	µg/kg		
Acetone	44	µg/kg	46	µg/kg		
Chromium	29	mg/kg	34.7	mg/kg		
Copper	12.9	mg/kg	19.5	mg/kg		
Lead	7.4	mg/kg	22.0	mg/kg		
Mercury	0.02	mg/kg	0.06	mg/kg		
Zinc	34.7	mg/kg	52.0	mg/kg		
	Scale Pit Sump Water		Scale Pit Sump Crystalline Material		Scale Pit Sump Sediment	
	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units
Acetone	44	µg/L	1,800	µg/kg		
Carbon disulfide			12	µg/kg		
2-Butanone			190	µg/kg		
Toluene			83	µg/kg		
Phenol			2,200	µg/kg	120	µg/kg
4-Methylphenol	3.6	µg/L	3,300	µg/kg		
Naphthalene			250	µg/kg		
2-Methylnaphthalene			1,500	µg/kg	89	µg/kg
2,4-Dichlorophenol	4.2J	µg/L				
2,4,6-Trichlorophenol	18	µg/L				
2,4,5-Trichlorophenol	210	µg/L	14,000	µg/kg		
Dimethylphthalate					120	µg/kg
Acenaphthlyene			3,300	µg/kg		
Acenaphthaene			400	µg/kg		
Dibenzofuran			610	µg/kg	66	µg/kg
Fluorene			2,600	µg/kg	92	µg/kg
Pentachlorophenol	510	µg/L	480,000	µg/kg	14,000	µg/kg
Phenanthrene			22,000	µg/kg	1,200	µg/kg
Carbazole			1,700	µg/kg	110	µg/kg
Anthracene			5,600	µg/kg	200	µg/kg
Di-n-butyl phthalate					700	µg/kg
Fluoranthene			37,000	µg/kg	1,800	µg/kg

Table 7, continued
Revised Pre-Demolition Investigation Report
Geomatrix Consultants, Inc.
May 8, 2006

Constituent	Scale Pit Sump Water		Scale Pit Sump Crystalline Material		Scale Pit Sump Sediment	
	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units
Pyrene			24,000	µg/kg	1,500	µg/kg
Butyl benzyl phthalate					310	µg/kg
Benzo(a)anthracene			14,000	µg/kg	540	µg/kg
Bis(2-ethylhexyl)phthalate			8,600	µg/kg	6,200	µg/kg
Chrysene			14,000	µg/kg	950	µg/kg
Di-n-octyl phthalate					370	µg/kg
Benzo(b)fluoranthene			17,000	µg/kg	1,300	µg/kg
Benzo(k)fluoranthene			13,000	µg/kg	1,000	µg/kg
Benzo(a)pyrene			13,000	µg/kg	700	µg/kg
Indeno(1,2,3-cd)pyrene			4,400	µg/kg	330	µg/kg
Dibenz(a,h)anthracene			1,000	µg/kg	80	µg/kg
Benzo(ghi)perylene			4,200	µg/kg	360	µg/kg
Antimony	0.10	mg/L				
Arsenic	0.20	mg/L	70	mg/kg	90	mg/kg
Cadmium	0.06	mg/L	13	mg/kg	19	mg/kg
Calcium					40,600	mg/kg
Chromium	0.25	mg/L	107	mg/kg	213	mg/kg
Copper	5.38	mg/L	2380	mg/kg	475	mg/kg
Iron					156,000	mg/kg
Lead	2.2	mg/L	3,070	mg/kg	3,950	mg/kg
Magnesium					6,240	mg/kg
Mercury	0.008	mg/L	1.19	mg/kg	1.43	mg/kg
Potassium					7,980	mg/kg
Sodium					42,400	mg/kg
Zinc	4.51	mg/L	6,960	mg/kg	3,740	mg/kg
Bromide					95.7	mg/kg
Fluoride					1,060	mg/kg
Sulfate					274,000	mg/kg
Chloride					38,100	mg/kg
Nitrate					737	mg/kg

Table 7, continued
Revised Pre-Demolition Investigation
Report Geomatrix Consultants, Inc.
May 8, 2006

Constituent	Copper Sump Water		Copper Sump Sediment		I-120 Sump Upper Water		I-120 Sump Bottom Water	
	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units
Methylene chloride			24J	µg/kg				
Acetone			830J	µg/kg	68	µg/L	840	µg/L
Carbon disulfide			29J	µg/kg				
2-Butanone			140J	µg/kg				
Toluene			10J	µg/kg	310	µg/L	30,000	µg/L
Phenol					330	µg/L	9.000	µg/L
2-Methylphenol					26	µg/L		
4-Methylphenol	2.7	µg/L			19,000	µg/L	72,000	µg/L
2,4-Dimethylphenol					26	µg/L		
Benzoic acid					100	µg/L		
Phenanthrene			6,900	µg/kg				
Carbazole			1,600	µg/kg				
Anthracene			950	µg/kg				
Fluoranthene			23,000	µg/kg				
Pyrene			17,000	µg/kg				
Benzo(a)anthracene			8,700	µg/kg				
Bis(2-ethylhexyl)phthalate	1.2	µg/L	22,000	µg/kg	12	µg/L		
Chrysene			14,000	µg/kg				
Benzo(b)fluoranthene			26,000	µg/kg				
Benzo(k)fluoranthene			20,000	µg/kg				
Benzo(a)pyrene			17,000	µg/kg				
Indeno(1,2,3-cd)pyrene			7,400	µg/kg				
Dibenz(a,h) anthracene			1,800	µg/kg				
Benzo[ghi]perylene			6,600	µg/kg				
Aroclor 1254			20,000J	µg/kg			200J	µg/L
TPH							74J	mg/L
Diesel							42	mg/L
Motor oil							43	mg/L

Table 7, continued
Revised Pre-Demolition Investigation
Report Geomatrix Consultants, Inc.
May 8, 2006

Constituent	Copper Sump Water		Copper Sump Sediment		I-120 Sump Upper Water		I-120 Sump Bottom Water	
	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units
Antimony							0.15	mg/L
Arsenic							0.09	mg/L
Cadmium			3.0	mg/kg			0.013	mg/L
Chromium			47	mg/kg	0.008	mg/L	0.156	mg/L
Copper	0.011	mg/L	1,730	mg/kg	0.039	mg/L	9.67	mg/L
Lead			78	mg/kg	0.001	mg/L	0.22	mg/L
Mercury			1.19	mg/kg			0.022	mg/L
Zinc	0.022J+	mg/L	1,060	mg/kg	0.090J+	mg/L	3.41	mg/L

Table 8
Round 6 Groundwater Monitoring
Rhone-Poulenc Marginal Way
Facility Tukwila, Washington
AGI Technologies
January 14, 2000

Constituent	Appendix IX Analysis			LNAPL Well H-10		Non-Appendix IX Wells		
	Maximum Concentration	Units	Sample Location	Maximum Concentration	Units	Maximum Concentration	Units	Sample Location
Benzene	130	µg/L	MW-17			85	µg/L	MW-18
Toluene	570,000	µg/L	MW-17	360,000	mg/kg	370,000	µg/L	H-11
Ethylbenzene	100	µg/L	MW-17			26	µg/L	H-11
Xylene (total)	24	µg/L	H-10			92	µg/L	MW-18
1,2,4-Trimethylbenzene						1.1	µg/L	MW-14
Benzyl alcohol	17	µg/L	H-10					
2-Methylphenol	220 E	µg/L	H-10					
4-Methylphenol	170 E	µg/L	MW-17					
2,4-Dimethylphenol	0.8 J	µg/L	H-10					
Naphthalene	0.3 MJ	µg/L	MW-17					
Pentachlorophenol	3.2 J	µg/L	MW-17					
1,4-Phenylenediamine	12 Y	µg/L	MW-17					
Arsenic	0.102	mg/L	MW-25			0.066	mg/L	MW-22
Barium	0.063	mg/L	MW-25					
Chromium	0.048	mg/L	MW-25			0.35	mg/L	MW-16
Copper	0.12	mg/L	MW-25			0.21	mg/L	MW-15
Lead	0.014	mg/L	MW-25			0.022	mg/L	DM-8
Mercury	0.00036	mg/L	MW-25			0.00027	mg/L	H-6
Nickel						0.032	mg/L	MW-16
Silver	0.0004	mg/L	MW-25					
Tin	0.06	mg/L	MW-17					
Vanadium	0.37	mg/L	MW-25			2.2	mg/L	MW-16
Zinc	0.014	mg/L	MW-17			0.075	mg/L	H-9

Notes:

E – value above linear range of detector

MJ – estimated value obtained from unusually integrated chromatograph

Y – indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

Table 9
Interim Measures Report, PCB Remediation & Sewer Cleaning Rhodia, Inc.
East Marginal Way Facility, Tukwila, Washington April 1, 1998

Constituent	Compressor Pad Remediation		Piping Trench Soil Remediation		Outfall 7 Rinsate and Stormwater Samples		Sewer Sediment Sample	
	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units
Barium, TCLP							1.4	mg/L
Cadmium, TCLP							0.035	mg/L
Copper					1.9	mg/L	6,300	mg/kg
Lead					0.14	mg/L		
Mercury					0.0056	mg/L		
Zinc					0.32	mg/L		
Phenanthrene					6J	µg/L		
Fluoranthene					51	µg/L		
Pyrene					36	µg/L		
Benzo(a)anthracene					23	µg/L		
Chrysene					26	µg/L		
Benzo(b)fluoranthene					20	µg/L		
Benzo(k)fluoranthene					12	µg/L		
Benzo(a)pyrene					12	µg/L		
Indeno(1,2,3-cd)pyrene					11	µg/L		
Benzo(g,h,i)perylene					10	µg/L		
Aroclor 1254	2.42	mg/kg	1,588.71	mg/kg	1.3	µg/L	6.6	mg/kg
Aldrin					0.062	µg/L		
4,4'-DDE					0.021	µg/L		
DDT					0.067	µg/L		
Heptachlor epoxide					0.028	µg/L		
Acetone							4,100	µg/L
Toluene							700	µg/L
m-xylene							310	µg/L
p-xylene							310	µg/L
o-xylene							500	µg/L

Table 10
RCRA Facility Investigation
Round 3 Data and Sewer Sediment Technical Memorandum
Rhone-Poulenc, Inc.
December 24, 1996

Constituent	Outfall Sewer Sediment		Process Sewer Sediment		Storm Sewer Outfall Intertidal Sediment	
	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units
Benzene	6	µg/kg				
Ethylbenzene	15	µg/kg	24	µg/kg		
Toluene	76,000	µg/kg	33,000	µg/kg		
Xylenes (total)	89	µg/kg	110	µg/kg		
Arsenic	156	mg/kg	400	mg/kg	22	mg/kg-dry
Cadmium	22.55	mg/kg	46	mg/kg	0.9	mg/kg
Chromium	202	mg/kg	220	mg/kg	41.1	mg/kg
Copper	31,200	mg/kg	41,300	mg/kg	83.5	mg/kg
Lead	427	mg/kg	2,920	mg/kg	133	mg/kg
Mercury					0.66	mg/kg
Silver	4.2	mg/kg	318	mg/kg	1	mg/kg
Zinc	3,930	mg/kg	4,410	mg/kg	191	mg/kg
Arochlor 1254	526,000	µg/kg	9,300	µg/kg		
Arochlor 1260			240	µg/kg		
2-Methylnaphthalene	0.35	ppm C	0.15	ppm C		
2-Methylphenol	330	µg/kg		µg/kg		
4-Methylphenol	31,000	µg/kg	8,500	µg/kg		
Acenaphthene	5.20	ppm C	1,450	ppm C		
Acenaphthylene	0.03	ppm C	0.08	ppm C		
Anthracene	6.53	ppm C	1.79	ppm C		
Benzo(a)anthracene	15.50	ppm C	5.53	ppm C		
Benzo(a)pyrene	14.40	ppm C	2.61	ppm C		
Benzo(b)fluoranthene	150,000	µg/kg	40,000	µg/kg		
Benzo(ghi)perylene	2.66	ppm C	2.86	ppm C		
Benzo(k)fluoranthene	84,000	µg/kg	35,000	µg/kg		
Benzyl alcohol			2,500	µg/kg		
Benzyl butyl phthalate	0.44	ppm C	2,481	ppm C		
Bis(2-ethylhexyl) phthalate	8.19	ppm C	1,120	ppm C		
Carbazole	54,000	µg/kg	15,000	µg/kg		

Table 10, continued
RCRA Facility Investigation
Round 3 Data and Sewer Sediment Technical Memorandum
Rhone-Poulenc, Inc.
December 24, 1996

Constituent	Outfall Sewer Sediment		Process Sewer Sediment		Storm Sewer Outfall Intertidal Sediment	
	Maximum Concentration	Units	Maximum Concentration	Units	Maximum Concentration	Units
Chrysene	21.04	ppm C	3.05	ppm C		
Di-n-butyl phthalate			1.32	ppm C		
Di-n-octyl phthalate	50.00	ppm C	112	ppm C		
Dibenzo(a,h)anthracene	3.54	ppm C	1.25	ppm C		
Dibenzofuran	2.21	ppm C	0.97	ppm C		
Dimethyl phthalate	0.0537	ppm C	0.28	ppm C		
Fluoranthene	44.30	ppm C	19.08	ppm C		
Fluorene	5.20	ppm C	1.41	ppm C		
HPAH	178.41	ppm C	63.80	ppm C		
Indeno(1,2,3-c,d)pyrene	8.97	ppm C	2.67	ppm C		
LPAH	56.04	ppm C	19.05	ppm C		
Naphthalene	1.04	ppm C	0.27	ppm C		
Pentachlorophenol	480	µg/kg				
Phenanthrene	37.65	ppm C	13.93	ppm C		
Phenol	7,600	µg/kg	3,500	µg/kg	32	µg/kg-dry
Pyrene	42.08	ppm C	15.27	ppm C		
Total benzofluoranthenes	25.91	ppm C	15.60	ppm C		

Table 11
RCRA Facility Investigation (RFI) Report
For the Marginal Way Facility, Tukwila, Washington
Rhone-Poulenc
June 19, 1995

Constituent	Soil Concentration			Sediment Concentration	
	Maximum Concentration	Units	Soil Investigation Area	Maximum Concentration	Units
Aluminum	19,700	mg/kg	A2	22,600	mg/kg
Antimony	21.2	mg/kg	A10		
Arsenic	61.4	mg/kg	A10	9.9	mg/kg
Barium	80.3	mg/kg	A6	56.1	mg/kg
Beryllium	1.10	mg/kg	A2	0.81	mg/kg
Cadmium	5.0	mg/kg	A10	0.40	mg/kg
Calcium	34,400	mg/kg	A10	5,700	mg/kg
Chromium	64.9	mg/kg	A9	25	mg/kg
Cobalt	28.7	mg/kg	A5	13.9	mg/kg
Copper	6,850	mg/kg	A1	57.4	mg/kg
Iron	50,400	mg/kg	A5	25,400	mg/kg
Lead	116	mg/kg	A7	26	mg/kg
Magnesium	15,100	mg/kg	A5	6,450	mg/kg
Manganese	941	mg/kg	A5	320	mg/kg
Mercury	268	mg/kg	A6	0.09	mg/kg
Nickel	65.7	mg/kg	A5	23.40	mg/kg
Potassium	902	mg/kg	A2		
Selenium	0.42	mg/kg	A1		
Silver	3.5	mg/kg	A1	0.190	mg/kg
Sodium	4,200	mg/kg	A7	3,940	mg/kg
Vanadium	185	mg/kg	A7	71.2	mg/kg
Zinc	1,990	mg/kg	A5	92.5	mg/kg
Acetone	13.0	mg/kg	A4		
Benzene	0.23	mg/kg	A4		
Bromoform	0.002	mg/kg	A4		
2-Butanone	1.1	mg/kg	A4		
Carbon disulfide	0.006	mg/kg	A7		
Ethylbenzene	6.4	mg/kg	A2		
Formaldehyde	3.4	mg/kg	A2		
Methylene chloride	1.6	mg/kg	A4		
2-Propanol	10	mg/kg	A2		

Table 11, continued
RCRA Facility Investigation (RFI) Report
For the Marginal Way Facility, Tukwila,
Washington Rhone-Poulenc
June 19, 1995

Constituent	Soil Concentration			Sediment Concentration	
	Maximum Concentration	Units	Soil Investigation Area	Maximum Concentration	Units
Trichloroethene	0.2	mg/kg	A4		
Toluene	4,900	mg/kg	A4		
Xylene	13	mg/kg	A2		
Acenaphthene	0.13	mg/kg	A2		
Anthracene	0.26	mg/kg	A2	26	µg/kg
Benz[a]anthracene	0.46	mg/kg	A2	220	µg/kg
Benzo(a)pyrene	0.65	mg/kg	A4	170	µg/kg
Benzo(b)fluoranthene	0.72	mg/kg	A4	240	µg/kg
Benzo(k)fluoranthene	0.59	mg/kg	A4	250	µg/kg
Benzo(g,h,i)perylene	0.41	mg/kg	A4	91	µg/kg
Benzyl alcohol	0.19	mg/kg	A2		
Benzyl butyl phthalate	0.09	mg/kg	A4	23	µg/kg
Bis(2-ethylhexyl)phthalate	6.80	mg/kg	A4	710	µg/kg
Carbazole	0.17	mg/kg	A4		
Chrysene	0.84	mg/kg	A4	410	µg/kg
2,4-Dimethylphenol	0.29	mg/kg	A2		
Di-n-butyl phthalate	0.43	mg/kg	A2	13	µg/kg
Di-n-octyl phthalate				140	µg/kg
Dibenzo(a,h)anthracene				26	µg/kg
Dibenzofuran	0.083	mg/kg	A2		
Dimethyl phthalate				19	µg/kg
Fluoranthene	1.80	mg/kg	A4	1,200	µg/kg
Fluorene	0.15	mg/kg	A2	15	µg/kg
Indeno(1,2,3-cd)pyrene	0.44	mg/kg	A4	120	µg/kg
Naphthalene	0.29	mg/kg	A4		
2-Methylnaphthalene	0.10	mg/kg	A4	17	µg/kg
2-Methylphenol	7.50	mg/kg	A2		
4-Methylphenol	5.10	mg/kg	A2	22	µg/kg
Pentachlorophenol	4.90	mg/kg	A1		
Phenanthrene	1.40	mg/kg	A2	470	µg/kg
Phenol	6.20	mg/kg	A2	130	µg/kg
Pyrene	1.50	mg/kg	A4	890	µg/kg
Vanillin	450	mg/kg	A1		

Table 11, continued
RCRA Facility Investigation (RFI) Report
For the Marginal Way Facility, Tukwila,
Washington Rhone-Poulenc
June 19, 1995

Constituent	Soil Concentration			Sediment Concentration	
	Maximum Concentration	Units	Soil Investigation Area	Maximum Concentration	Units
Aldrin				2.3	µg/kg
Alpha-chlordane	0.018	mg/kg	A5	1.3	µg/kg
Aroclor-1254	2.8	mg/kg	A3	210	µg/kg
Aroclor-1260				50	µg/kg
BHC-delta				11	µg/kg
4,4'-DDD	0.20	mg/kg	A5	160	µg/kg
4,4'-DDE	0.62	mg/kg	A5	45	µg/kg
4,4'-DDT	2.6	mg/kg	A5	180	µg/kg
Dieldrin	0.0095	mg/kg	A5	3.3	µg/kg
Endosulfan I	0.0065	mg/kg	A5	1.3	µg/kg
Endosulfan II	0.024	mg/kg	A5	2.8	µg/kg
Endosulfan sulfate	0.0096	mg/kg	A5	9.4	µg/kg
Endrin	0.022	mg/kg	A5		
Endrin aldehyde	0.11	mg/kg	A5	5.1	µg/kg
Endrin ketone	0.019	mg/kg	A5	5.1	µg/kg
Gamma-chlordane	0.026	mg/kg	A5	4.4	µg/kg
Methoxychlor	0.04	mg/kg	A5	12	µg/kg
TPH	645	mg/kg	A6		

Attachment 3

Tabulated Preliminary Screening Tables and PRGs

Table 1
Screening of Constituents Historically Detected in Groundwater Vs. Draft 2020 PRGs

Constituent	Maximum		Notes		
		Units	Over Lowest of Groundwater to Protect Drinking Water Values	Over Lowest of Surface Water Value	Over Lowest Vapor Intrusion Value
Aluminum	880,000	µg/L	Yes	NA	NA
Arsenic	107	µg/L	Yes	Yes	NA
Barium	63	µg/L	No	No	NA
Cadmium	6	µg/L	Yes	Yes	NA
Calcium	176000	µg/L	NA	NA	NA
Chromium	2,590	µg/L	Yes	NA	NA
Copper	1,880	µg/L	Yes	Yes	NA
Iron	248000	µg/L	Yes	Yes	NA
Lead	196	µg/L	Yes	Yes	NA
Magnesium	308000	µg/L	NA	NA	NA
Manganese	4030	µg/L	Yes	Yes	NA
Mercury	9.76 J	µg/L	Yes	Yes	NA
Nickel	610	µg/L	Yes	Yes	NA
Potassium	118000	µg/L	NA	NA	NA
Selenium	50	µg/L	No	Yes	NA
Silver	0.4	µg/L	No	No	NA
Sodium	3890000	µg/L	NA	NA	NA
Tin	60	µg/L	No	No	NA
Vanadium	4,290	µg/L	Yes	No	NA
Zinc	2,770	µg/L	No	Yes	NA
Acetone	120	µg/L	No	No	No
Benzene	130	µg/L	No	Yes	Yes
Bromoform	ND		--	--	--
2-Butanone	1.3	µg/L	No	No	No
sec-Butylbenzene	ND		--	--	NA
Carbon disulfide	1.7	µg/L	No	No	No
1,4-Dichlorobenzene	0.1 J	µg/L	No	No	No
cis-1,2-Dichloroethene	0.4	µg/L	No	No	NA
Ethylbenzene	100	µg/L	Yes	Yes	Yes
4-Isopropyl toluene	2.2	µg/L	NA	NA	NA
Methylene chloride	4.1	µg/L	No	No	No
Tetrachloroethene	ND		--	--	--
Toluene	570,000	µg/L	Yes	Yes	Yes
Trichloroethene	ND		--	--	--
1,2,4-Trimethylbenzene	1.1	µg/L	No	NA	No
1,3,5-Trimethylbenzene	0.2 J	µg/L	No	No	No
Xylene (total)	92	µg/L	No	No	No
m,p-Xylene	1.8J	µg/L	No	No	No

Constituent	Maximum		Notes		
		Units	Over Lowest of Groundwater to Protect Drinking Water Values	Over Lowest of Surface Water Value	Over Lowest Vapor Intrusion Value
o-Xylene	0.9J	µg/L	No	No	No
Acenaphthene	ND		--	--	--
Acenaphthylene	ND		--	--	--
Anthracene	ND		--	--	--
Benzo[a]anthracene	ND		--	--	--
Total Benzofluoranthenes	ND		--	--	--
Benzo(k)fluoranthene	--		--	--	--
Benzo[ghi]perylene	ND		--	--	--
Benzo(a)pyrene	ND		--	--	--
Benzoic acid	ND		--	--	--
Benzyl alcohol	17	µg/L	No	No	NA
Bis(2-ethylhexyl)phthalate	5.1	µg/L			
Butyl benzyl phthalate	ND		--	--	--
Carbazole	ND		--	--	--
Chrysene	ND		--	--	--
Dibenz(a,h)anthracene	ND		--	--	--
Dibenzofuran	ND		--	--	--
2,4-Dimethylphenol	0.8 J	µg/L	No	No	NA
Di-n-butyl phthalate	ND		--	--	--
Fluoranthene	ND		--	--	--
Fluorene	ND		--	--	--
Indeno(1,2,3-cd)pyrene	ND		--	--	--
2-Methylnaphthalene	ND		--	--	--
2-Methylphenol	220 E	µg/L	No	Yes	NA
4-Methylphenol	170 E	µg/L	No	No	NA
Naphthalene	0.3 MJ	µg/L	Yes	Yes	No
Pentachlorophenol	3.2 J	µg/L	Yes	No	NA
Phenanthrene	ND				
Phenol	400 ES	µg/L	No	Yes	NA
1,4-Phenylenediamine	12 Y	µg/L	No	NA	NA
Pyrene	ND		--	--	--
2,4,5-Trichlorophenol	ND		--	--	--

Table 2
Screening of Constituents Historically Detected in Soil Vs. Draft 2020 PRGs

Constituent	Maximum Soil		Notes				
		Units	Lowest of Residential Soil RSL Values	Lowest of Composite Worker Soil RSL Values (or Background if Higher)	LDW PCUL SL-8 Protect Sediment via Bank Erosion	EPA RSL Soil Screening Level to Protect Groundwater (Risk-based)	EPA RSL Soil Screening Level to Protect Groundwater (MCL-based)
Aluminum	19,700	mg/kg	No	No	No	No	NA
Antimony	21.2	mg/kg	No	No	No	Yes	Yes
Arsenic	61.4	mg/kg	Yes	Yes	Yes	Yes	Yes
Barium	169	mg/kg	No	No	No	Yes	Yes
Beryllium	1.1	mg/kg	No	No	No	No	No
Cadmium	5	mg/kg	No	No	No	Yes	Yes
Calcium	34,400	mg/kg	NA	NA	NA	NA	NA
Chromium	64.9	mg/kg	Yes	Yes	No	No	No
Cobalt	28.7	mg/kg	Yes	No	No	Yes	NA
Copper	18,200	mg/kg	Yes	No	Yes	Yes	Yes
Iron	50,400	mg/kg	No	No	No	Yes	NA
Lead	116	mg/kg	No	No	No	NA	Yes
Magnesium	15,100	mg/kg	NA	NA	NA	NA	NA
Manganese	941	mg/kg	No	No	NA	Yes	NA
Mercury	268	mg/kg	Yes	Yes	Yes	Yes	Yes
Nickel	65.7	mg/kg	No	No	No	Yes	NA
Potassium	902	mg/kg	NA	NA	NA	NA	NA
Selenium	0.8 J	mg/kg	No	No	No	Yes	Yes
Silver	3.5	mg/kg	No	No	No	Yes	NA
Sodium	4,200	mg/kg	NA	NA	NA	NA	NA
Vanadium	185	mg/kg	No	No	No	Yes	NA
Zinc	1,990	mg/kg	No	No	Yes	Yes	NA
Acetone	13	mg/kg	No	No	NA	Yes	NA
Benzene	0.23	mg/kg	No	No	NA	Yes	Yes
Bromoform	0.002	mg/kg	No	No	NA	Yes	No
2-Butanone	1.1	mg/kg	No	No	NA	No	NA
sec-Butylbenzene	0.0008 J	mg/kg	No	No	NA	No	NA
Carbon disulfide	0.038	mg/kg	No	No	NA	No	NA
1,4-Dichlorobenzene	0.0092	mg/kg	No	No	No	Yes	No
cis-1,2-Dichloroethene	0.0025	mg/kg	No	No	NA	No	NA
Ethylbenzene	6.4	mg/kg	Yes	No	NA	Yes	Yes
Formaldehyde	3.4	mg/kg	No	No	NA	Yes	NA
4-Isopropyl toluene	0.024	mg/kg	NA	NA	NA	NA	NA
Methylene chloride	1.6	mg/kg	No	No	NA	Yes	Yes
Tetrachloroethene	0.0017 J	mg/kg	No	No	NA	No	No

Constituent	Maximum Soil		Notes				
		Units	Lowest of Residential Soil RSL Values	Lowest of Composite Worker Soil RSL Values (or Background if Higher)	LDW PCUL SL-8 Protect Sediment via Bank Erosion	EPA RSL Soil Screening Level to Protect Groundwater (Risk-based)	EPA RSL Soil Screening Level to Protect Groundwater (MCL-based)
Toluene	4,900	mg/kg	No	No	NA	Yes	Yes
Trichloroethene	0.2	mg/kg	No	No	NA	Yes	Yes
1,2,4-Trimethylbenzene	ND		--	--	--	--	--
1,3,5-Trimethylbenzene	ND		--	--	--	--	--
Xylene (total)	13	mg/kg	No	No	NA	Yes	NA
m,p-Xylene	0.0015	mg/kg	No	No	NA	No	NA
o-Xylene	ND		--	--	--	--	--
Acenaphthene	0.13	mg/kg	No	No	No	No	NA
Acenaphthylene	0.0037	mg/kg	NA	NA	No	NA	NA
Anthracene	0.26	mg/kg	No	No	No	No	NA
Benzo[a]anthracene	0.46	mg/kg	No	No	No	Yes	NA
Total Benzofluoranthenes	0.1	mg/kg	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.72	mg/kg	No	No	NA	Yes	NA
Benzo(k)fluoranthene	0.59	mg/kg	No	No	NA	No	NA
Benzo[ghi]perylene	0.41	mg/kg	NA	NA	No	NA	NA
Benzo(a)pyrene	0.65	mg/kg	Yes	No	No	Yes	No
Benzoic acid	0.098 J	mg/kg	No	No	No	No	NA
Benzyl alcohol	0.19	mg/kg	No	No	Yes	No	NA
Bis(2-ethylhexyl)phthalate	6.8	mg/kg	No	No	Yes	Yes	Yes
Butyl benzyl phthalate	0.023	mg/kg	No	No	No	No	NA
Carbazole	0.17	mg/kg	NA	NA	NA	NA	NA
Chrysene	0.84	mg/kg	No	No	No	No	NA
Dibenz(a,h)anthracene	0.016 J	mg/kg	No	NA	No	No	NA
Dibenzofuran	0.12	mg/kg	No	No	No	No	NA
2,4-Dimethylphenol	0.29	mg/kg	No	No	Yes	No	NA
Di-n-butyl phthalate	0.43	mg/kg	No	No	No	No	NA
Fluoranthene	1.8	mg/kg	No	No	Yes	No	NA
Fluorene	0.15	mg/kg	No	No	No	No	NA
Indeno(1,2,3-cd)pyrene	0.44	mg/kg	No	No	No	No	NA
2-Methylnaphthalene	0.1	mg/kg	No	No	No	No	NA
2-Methylphenol	7.5	mg/kg	No	No	Yes	Yes	NA
4-Methylphenol	5.1	mg/kg	No	No	Yes	Yes	NA
Naphthalene	0.29	mg/kg	No	No	No	Yes	NA
Pentachlorophenol	4.9	mg/kg	Yes	Yes	Yes	No	No
Phenanthrene	1.4	mg/kg	NA	NA	No	NA	NA
Phenol	6.2	mg/kg	No	No	Yes	Yes	NA
2-Propanol	10	mg/kg	No	No	NA	Yes	NA
Pyrene	1.5	mg/kg	No	No	No	No	NA

Constituent	Maximum Soil		Notes				
		Units	Lowest of Residential Soil RSL Values	Lowest of Composite Worker Soil RSL Values (or Background if Higher)	LDW PCUL SL-8 Protect Sediment via Bank Erosion	EPA RSL Soil Screening Level to Protect Groundwater (Risk-based)	EPA RSL Soil Screening Level to Protect Groundwater (MCL-based)
2,4,5-Trichlorophenol	0.0079	mg/kg	No	No	No	No	NA
Vanillin	450	mg/kg	NA	NA	NA	NA	NA
Total cPAHs	0.106	mg/kg	NA	NA	NA	NA	NA
Alpha chlordane	0.018	mg/kg	No	No	NA	Yes	No
4,4'-DDD	0.2	mg/kg	No	No	No	Yes	NA
4,4'-DDE	0.62	mg/kg	No	No	No	Yes	NA
4,4'-DDT	2.6	mg/kg	Yes	No	Yes	Yes	NA
Dieldrin	0.0095	mg/kg	No	No	Yes	Yes	NA
Endosulfan I	0.0065	mg/kg	NA	NA	No	NA	NA
Endosulfan II	0.024	mg/kg	NA	NA	No	NA	NA
Endosulfan sulfate	0.0096	mg/kg	No	No	No	No	NA
Endrin	0.022	mg/kg	No	No	No	No	No
Endrin aldehyde	0.11	mg/kg	NA	NA	NA	NA	NA
Endrin ketone	0.019	mg/kg	NA	NA	NA	NA	NA
Gamma-chlordane	0.026	mg/kg	No	No	NA	Yes	No
Methoxychlor	0.04	mg/kg	No	No	No	No	No
PCBs (Arochlor 1254)	1,588.71	mg/kg	Yes	Yes	NA	Yes	NA

Attachment 4

Groundwater Sampling Field Log

DALTON OLMSTED FUGLEVAND	**Monitoring Well Sampling Field Sheet**	Well No.
		Facility: FRP
Date:	Sampling Personnel:	Weather Conditions:
Sampling Method: Low-flow		Initial DTW:
Equipment Used:	1 Volume = 0.17 * (total well depth - water level)	Final DTW:
		Pump Intake Depth (ft) TOC:

Water Quality Measurements

Time	Water Level	pH	SC	Temperature	Dissoved Oxygen	Redox Potential	Turbidity	Notes
(military)	ft btoc	Std. Units	uS/cm	^{0}C	mg/L	mV	(NTU)	

Sample ID No.: ____________________

Purge Start Time ____________________ **Sample Collection Time:** ____________________

Purge Completion Time ____________________ **Containers Used:** ____________________

Avg Purge Rate (mL/min) ____________________ **Chemical Analyses:** ____________________

Analytical Lab: Analytical Resources Inc.

Other Observations: ____

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